RAILROAD GAZETTE

FRIDAY, AUGUST 21.

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Contributions.

Reasons for Not Reducing Fares.

WASHINGTON, D. C., July 25, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to "Excursion Fares," on page 507 of the *Railroad Gazette* of yesterday, and the question, "What justifies a reduction from the regular passenger fare?" I would remark, in the first place, that the present fares are so low there is little or no room for reduction if roads expect to keep their lines in a fair physical condition and meet their obligations on the money that has been invested with the hope of building up the sections of country through which they pass to such an extent as to enable them to become profitable investments to their stock and bondholders. Of course, when western New York becomes more populous, it and sections of other states can consider the practicability of running long distance excursions at less than the regular passenger fare.

From close observation it appears to me that a railroad should be paid *more* than the regular fare for the risk incurred in running a long extra train full of precious lives, in the face of and close behind all of its other trains of every description, which the public demands shall be moved faster each year. We will grant the railroads of western New York and of other states good signal service and competent train crews; but an extra train of any class, as every man in the train service knows, runs extra risks, and those risks are increased as these extra trains approach New York or other great cities, inasmuch as there are more trains to be looked out for as the extra train draws nearer the small end of the funnel. If an excursion train should have an accident, resulting in the death or injury of one or two of the excursionists, it would take all the revenue derived from such train, and possibly the value of the train and engine besides, to gratify the demands of the injured and killed. The witch most dreaded by all railroad men is accident to passengers. Besides having to pay the demands (often unjust) of injured parties, accidents usually have a tendency to subject the road to more or less odium in the eyes of its patrons and this sometimes leads through passengers to seek another route.

When a railroad runs an excursion for reduced round-trip tickets, the scalper is usually on hand at the point to which such excursion runs, ready to send a different passenger back to the initial point of the excursion at less than the regular rate. There is little or no margin for reduction of any kind in through or local regular fares in many sections of the United States. Sometimes a road needing money necessary to meet pressing obligations does face all risks, and runs a few cheap excursion trains. If a few idle cars can be run on an excursion or two without accident, the proceeds will help to pay the interest on and remove the trust plate from them. It is true the trains are running to Niagara and Chautauqua Lake with the coaches not full, and to get them full, while they are obliged to run, during certain periods, tickets are sold to such points a little lower than the regular rate with the hope of carrying a passenger in each seat in the coaches. But all this has a bad tendency. Would the average American citizen be content for the railroads to haul him in an emigrant car? They cannot carry him in the coaches of the present day at less than the present regular rates.

J. I. H.

Two-Cylinder Compound Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been waiting for some of the many two-cylinder compound locomotive enthusiasts to answer the remarks by Mr. S. M. Vauclain at the Railroad Convention and published in the *Railroad Gazette* June 26, 1891. It seems to me that they are a little backward in defense. The main point which Mr. Vauclain made against the two-cylinder compound is that the cylinder ratio could not be made large enough and room still be found for the cylinders within the permissible width of the locomotive. Now, I cannot see quite why this is.

Why should not the crosshead be offset to one side the necessary distance to bring the cylinders within the limit of width. Two inches offset would permit a four-inch larger cylinder, and I cannot believe that two inches offset would be a more objectionable mechanical arrangement than the crosshead which Mr. Vauclain uses.

But even supposing this could not be done, why not move the frames and the driving boxes toward the centre? This would bring the outside of the hubs of the driving wheels nearer together, and the centres of the crank pins could be moved in to suit. There is no objection to moving the frames closer together on locomotives that have the firebox above the frames, and a majority of the engines which Mr. Vauclain thinks could not be compounded satisfactorily with two cylinders are built in that way. Now, if the centres of the frames be brought four inches closer, the centres of the cylinders could be reduced four inches nearer and the low pressure cylinder could be made four inches larger in diameter, which would make quite a respectable increase in its area.

There is still another way to meet this difficulty, and this brings up another point made by Mr. Vauclain. He thinks a cylinder ratio of 3 to 1 is necessary in order to get sufficient expansion. Why, instead of this, should not the ratio be kept at 2 to 1, and a greater expansion be obtained in the high pressure cylinder? The majority of indicator cards published from two-cylinder compound engines show that there is less expansion in the high pressure cylinders than in the low. Why is this necessary? Why not make the high pressure cylinder larger in diameter and expand more in it than in the low pressure? Such a step would not only give the desired increase in expansion, but would also assist the locomotive in starting. It is being generally conceded that the difficulty with the two-cylinder engine, is that after the first exhaust of the high pressure cylinder, when it should be exerting a comparatively high pressure on the crank pin, it is not doing so because of the back pressure in the receiver, and when working compound the two-cylinder locomotive has not as much average total pressure on the piston as the simple engine which it was built to replace. This has resulted from an empirical rule that has been generally followed; it is that which makes the high pressure cylinder of the compound engine about 1 in. larger in diameter than the cylinders of the simple engine, to which it is supposed to be an equivalent in power. This is wrong. An empirical rule for cylinder dimensions is nearly always in error, and is right only for one particular condition. I think that it is such points as these that the two-cylinder compound advocates should consider, and not allow what is really the simplest and most desirable type of compound to be condemned without defense.

TWO CYLINDERS.

Honest Conductors.

BOSTON, Mass., Aug. 11, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of July 17 you publish a paragraph saying that the Southern Pacific Railroad has decided to do away with train collectors. The paragraph is followed by some editorial remarks which are rather surprising to men who know railroad men fairly well. The remarks referred to are as follows: "It is true that it is often easier to select honest money handlers from among office clerks than from among freight conductors, for the simple reason that these two classes were originally recruited with very different ends in view, and it may, therefore, in many cases, seem good economy to put on train collectors."

Certainly you did not *intend* to make a wholesale charge of this sort against so large a class of men as the freight conductors of American railroads. It seems to the writer that an explanation and apology is due from you.

It is no imputation on the honesty of office clerks who wear good clothes to say that there are plenty of freight brakemen and freight conductors who wear dirty clothes when at work who are just as honest. Certainly the average of natural honesty is much the same in all classes of men.

You accept (apparently) the general view "that voluntary honesty is either native—or not there." Can you not go farther and say all real honesty is voluntary? Elevated position or high pay never made a rogue over into an honest man. A rogue will think more of $10 he can steal or cheat one out of than of $100 he can earn fairly. Almost anybody can earn a hundred dollars, but it takes a sharp fellow to steal it or cheat one out of it.

Your editorial says, "To train a passenger conductor for collecting $50 per day by keeping him for 10 years on a freight train where he handles no money at all, is to deliberately neglect the cultivation of his spirit of honesty."

This is as wrong and unfair as the first quotation. It evidently implies that if you do not train a man to handle money you are not training him to honesty.

These freight men handle many times $50 worth of property per day, which could be used or disposed of with little more risk than is taken in taking money. Do the freight conductors as a rule steal? No man thinks they do. Once in a while there is a lame one, but so there is once in a while a lame minister of the Gospel. It is as fair to charge the wrong-doing of a few on a whole class in one case as in the other.

All the considerable defalcations in the country are by men who were trained to handle more money than $50 per day. Maybe you mean "cultivation of the spirit of honesty" only extends to amounts of $50 per day, and if that amount is exceeded the spirit of honesty cultivates in the other direction.

In any view of the case it seems clear, as before said, that you owe a large class of good railroad men an explanation and apology. They wait to hear from you.

A. A. JACKSON.

[It is hard to say anything on such a delicate subject without giving offense and every one knows that "comparisons are odious." Moreover the relative honesty of two classes of men must be largely a matter of speculation. Therefore it would perhaps have been more sensible not to have touched a subject so full of snares for the hasty or unwary. Certainly we intended to make no wholesale charge against freight conductors; but we thought and still think that, given the same material to start with (the natural man), the avocation which best trains a man to exactness in accounting and which makes him most familiar with the dangers and obligations of financial responsibility will be most likely to produce a man of practical honesty. We do not say that it will make him actually any more conscientious, but that it will give him a more realizing sense of the business value of honesty as a policy. In business it is not safe or right to give money responsibilities to a great body of men of whom you can know personally but little, unless you can check them very closely or give them a practical motive for being honest. Quite a number of years ago the General Superintendent of a great railroad issued an order that no passengers should be carried on through freight trains, and that no one should be carred on a way freight unless he had a ticket. It was the duty of the conductor to see that no passenger left a station until he had his ticket. The passenger receipts on that road increased nearly $1,000 a day at once; and that year they were $330,000 more than they had been the year before. The increase was easily traceable to this order. We do not tell this incident as proving that freight conductors are less honest than other men, but because it does show how well it pays to watch any body of men similarly placed. EDITOR RAILROAD GAZETTE.]

Signaling the Fourth Avenue Tunnel, New York.

We announced last week the fact that the Fourth Avenue Tunnel signaling is to be thoroughly overhauled and that the contract has been let to the Johnson Railroad Signal Company. In all the discussion called out by the accident last spring we have held that this tunnel is operated on a high standard of practice, that the signaling is well up to the "state of the art" and that the immense traffic in and out has been handled with reasonable skill and safety. Therefore the storm of criticism which was lately raised by those who really know little or nothing of the local conditions to be met, or of the practice of handling trains or of the art of signaling, was uncalled for. Nevertheless the responsible officers have resolved to improve on all existing practice, and to make, in the tunnel signaling, a distinct advance. The present practice, the conditions to be met and the schedule of requirements prepared by Mr. Platt, General Manager Harlem Line, are outlined in what follows. The requirements are those on which bids were made and the contract let.

The present system is the Sykes, combined with the track circuit; added to this is the Scott indicator, which shows to the operator in each tower whether the blocks or sections controlled by him are clear or occupied. There are also audible signals, both torpedo and gong, working in harmony with the visual home signals. All visual signals in the tunnel are in duplicate, one on either side of each track, and work simultaneously.

While it is believed that the system as now arranged is the safest in use in this country or any other, it is the aim to make additional safeguards, and provide for the *occasional* failure of the electric current, through the Sykes cabinet and the track, to perform its part in unlocking the signal levers. The latter is especially important, inasmuch as it is more difficult to maintain a perfect track circuit through a tunnel than elsewhere; and the further fact that with a movement of about 500 trains and engines over the line every day, even the occasional delay caused by such failure cannot be permitted.

The specifications and requirements for the new signals briefly stated are as follows:

1. All safeguards and indicators, now in use through the Sykes cabinets, or otherwise, to be retained, and to work in harmony with the improved system.

2. The blocks or sections to extend 100 ft. beyond each home signal, and be so arranged that it shall be impossible to clear the signals in the rear of the section until a train once admitted has passed entirely out.

3d. New cabinets and locks to be so arranged that gravity shall be overcome to unlock levers, instead of allowing gravity to assist in unlocking as in the present cabinets.

4. An independent and direct circuit together with supplemental cabinets shall be provided to unlock a caution lever in the rear tower of each section to enable the operator there to withdraw the audible signals, and show a caution signal in case the regular track circuit is out of order; this secondary or green signal only to be used by the concurrent action of the operators in both towers.

5. Circuits and locks to be so arranged that it shall be impossible for operators to show a clear signal when the section ahead is occupied.

6. It shall be impossible for any operator to show either a clear or caution signal without the permission and co-operation of the operator in the advance tower.

7. The green or caution signal cannot be shown until the preceding train, or some part of it, shall have reached and passed the advance tower.

8. All visual signals to assume the danger position automatically when the train for which they were cleared passes them.

9. All signals to be repeated to towers controlling them, repeaters to show position of signals visually and to warn audibly if not working properly, or light extinguished.

10. The primary and secondary cabinets and circuits to be so arranged as not to conflict in any way with each other. The use of the secondary circuits not to be a bar to prevent the use of the primary or track circuit for the next train.

11. All signals and mechanical devices to be weighted to the danger position, and the whole system so arranged that the failure of any part of it would put and hold the signals at danger.

12. The audible signals not to assume *automatically* the danger position on the passage of an engine or car.

13. The visual and gong signals to be put to danger by the operator at any time; during the passage of a train if necessary.

14. Torpedo exploders to be so connected that they cannot be restored to danger during the passage of a train, but can be at all other times; this to prevent operators from throwing a torpedo exploder to the danger position before the last truck has passed, leaving the chamber empty during the approach of the following train.

15. Audible signals, both torpedo and gong, to work in harmony with visual signals, except as above provided.

16. Movement of signals, detector bars, etc., to have the benefit of the full stroke of the lever.

17. Cabinets and locks to be so arranged that the plunger cannot be pushed in when the section is occupied.

18. Cabinets to be of durable parts, strongly made, simple in plan, and so arranged that the plunger contact shall be full and complete at each stroke.

The other requirements pertain only to the mechanical construction. All problems raised by these specifications have been successfully met and without complicated currents or mechanism.

Cranes for Railroad Uses.

BY WM. L. CLEMENTS, M. E.

II.

Other transferring appliances for station and yard use are simple and generally of hand power. For stationary work two types are shown and are well adapted for freight receiving or delivering yards, fig. 5 representing the much used pillar or post crane, now made in all capacities to 40 tons, and the transfer crane, fig. 6, made in the same capacities.

The use of stationary cranes necessitates the inconvenience of bringing to the machine material to be transferred, involving expense as to shifting cars, labor required and delays. There is in successful use for freight-yard purposes a portable steam crane, shown in fig. 7. Its uses and advantages are manifest, it being self-propelling and capable of moving a single-loaded car, also radius varying; and slewing a complete circle, through the power of the engine and boiler, it may reach freight otherwise inaccessible to power machinery. Unfortunately, with the intermittent use of such a machine, the condition in smaller freight and receiving stations, the presence of an operator at all times is not economical unless his services can be otherwise used. Remedying this defect the machine is made without a boiler, to receive steam for its operation from a locomotive, to which it may be attached and propelled to any desired location, and thus can be readily thrown in or out of service at any time.

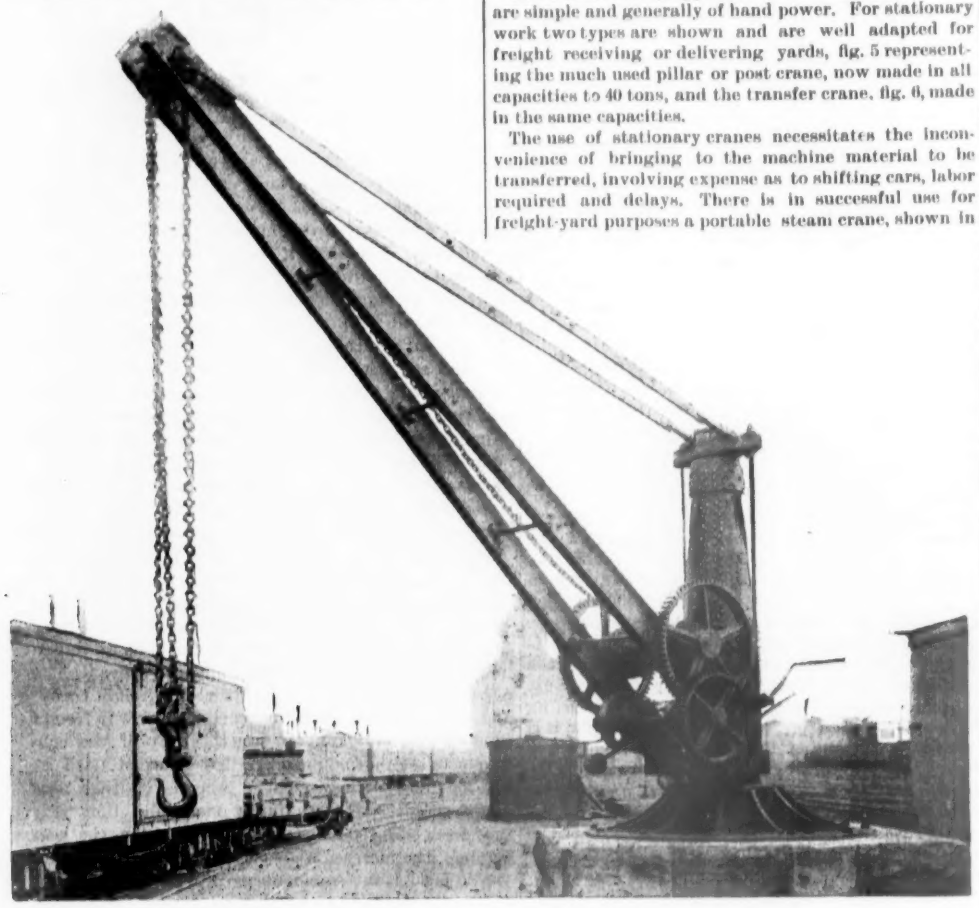


Fig. 5—Pillar Crane for Yard Work.

These general considerations embody the use of serviceable cranes for yard work. For the receipt and distribution of quantities of barrel or package freight other designs of conveyers are preferable, and for bulk freight and its transference from car to car the problem of success of design has not been solved.

It is hardly necessary to state as applying to the miscellaneous equipment of cranes, freight handling, and power devices of all kinds used, intermittently, about the shops, freight yards and stations of railroads, that the question of the applications of power for these devices is an important one, not only for economical maintenance but for effectiveness and suitableness for the machine and purposes desired.

Motive Power.—It is undisputed that the direct use of the steam engine as a motive power is most economical of all artificial powers, provided proper transmissions of steam may be made. Such favorable condition, however, is but rarely to be had. The objections to boilers and fire risks and their expensive attendance and maintenance compel a concentration of the steam plant. Therefore for long distance power transmission, as is now usual in the operation of labor-saving machinery about railroad shops, freight yards, stations, etc., steam cannot be used economically for the great objection of condensation, expansion and contraction of conduits and loss of pressure, with the consequent expense. Various are the methods for power transmission for such work, which have been successfully used, with more or less economy, and a comparison of some of them is of service in the installation of the machines under consideration.

High-pressure water transmission, compressed air, wire rope, shafting and electricity are other successful agencies for comparison.

Water power may be transmitted with but little loss. In the machines themselves the useful effect is as high as 90 per cent. in direct acting apparatus, and as low as 50 per cent. in cases of great multiplying power of 16 to 1. The efficiency of an engine pumping water into an accumulator may be taken at approximately 75 per cent., and the compound efficiency will therefore be ascertained by combining this with the above ratios of efficiency. Hydraulic appliances cause a waste of water when the maximum capacities of the machines are not exerted. In the case of a crane it may occasionally be used with but light loads, when as much water is consumed as would be requisite to lift a heavy one. However, in modern designs proper valve arrangements, with several rams, materially decrease this loss. The loss of efficiency by transmission through pipes, if sufficiently large, is but little. The compound efficiency of the hydraulic system, applied to cranes in shops and warehouse work, in view of these losses does not exceed 40 per cent.

The use of compressed air as a motive power has always entailed an enormous loss of effect. This is due to two causes: First, the compression of air generates a great quantity of heat, which is dissipated by condensation before the air reaches the place where it is to do its work. Second, should the air be used expansively its cooling produces ice which clogs the valves and pass-

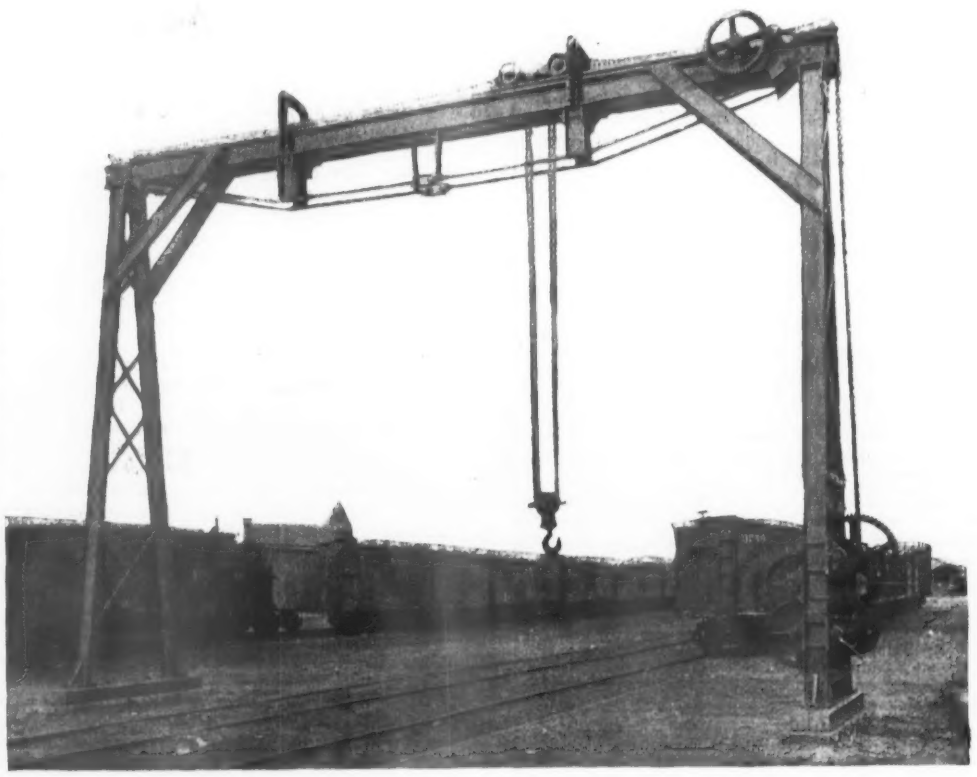


Fig. 6—Transfer Crane for Yard Work.

ages and stops the working; therefore it is generally used without expansion, which, of course, entails serious loss.

Hence, it is desirable to produce in the air compressor itself the cooling which takes place afterward and to protect the air, during expansion, from cooling below freezing temperature. The more the air is cooled during the process of compression the less is the expenditure of work on compression and greater is the efficiency. The less the degree of compression the greater its efficiency,

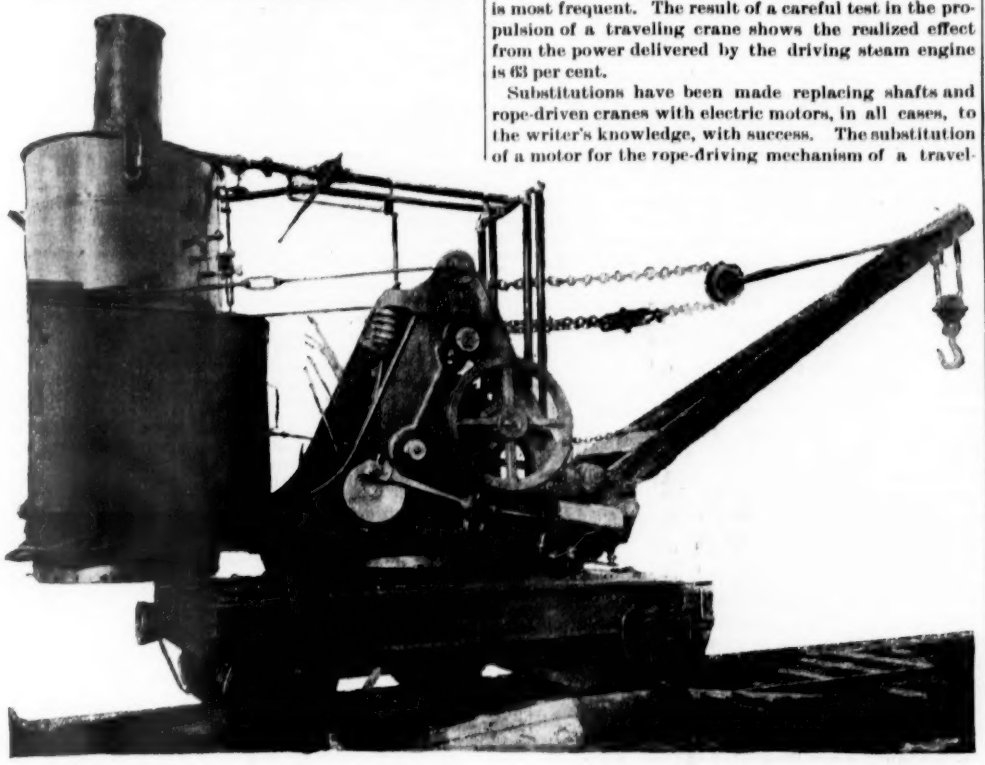


Fig. 7—Portable Yard Crane.

because the less is the proportional loss from the intense reduction of temperature, or the efficiency is reduced as the pressure is multiplied, add that the efficiency of the machines themselves is a factor, and if taken at 90 per cent. the compound efficiency is 40 per cent., say a half. The ultimate effect of the combined air compressor and motor rarely exceeds 30 per cent.

The loss of power in transmission by ropes varies only as the velocity, whereas either by compressed air or by water the loss due to friction increases as the square of the velocity. For transmissions within 1,000 ft. with rope running 4,000 ft. per minute the loss of power in transmission equals 17½ per cent. approximately. The sources of loss are: 1st, resistance of the air to the arms of the wheels; 2d, resistance of rigidity in passing over the wheels; 3d, axle friction of 2½ per cent. for single transmissions. In the transmission of power by ropes to cranes, a system of three driving sheaves for the propulsion of the crane machinery is ordinary. In such transmission experience and tests have shown a loss of 18 to 20 per cent., or a compound efficiency connecting the driving engine of from 42 to 45 per cent. for ordinary crane service.

The use of shafting for the transmission of power to some positions necessary for the purposes under consideration can seldom be made. However, for traveling and jib crane propulsion its use is ordinary and successful. The objections for such service are wear and tear, friction, attention for lubrication and repairs, necessitating the ready accessibility of parts.

The amount of power lost in such transmission varies widely with the state in which it is maintained. With an ordinarily maintained line of crane shafting running 250 revolutions per minute the loss due to friction of bearings and connections is not less than 37 per cent. A length of 300 ft. of shafting frequently absorbs 3.25 H. P.

The use of electricity for these miscellaneous services has been but recently developed, and as to its efficiency but few accurate results can be given.

Its application for traveling cranes and transfer tables is most frequent. The result of a careful test in the propulsion of a traveling crane shows the realized effect from the power delivered by the driving steam engine is 63 per cent.

Substitutions have been made replacing shafts and rope-driven cranes with electric motors, in all cases, to the writer's knowledge, with success. The substitution of a motor for the rope-driving mechanism of a traveling crane has shown the following result. It may be here stated that the crane was of the ordinary belt-shifting type, with driving rope passing over three propelling sheaves. The substitution, therefore, combined electric and belt transmission. In lifting a load of eight tons 4 ft. per minute there was absorbed by rope and belt mechanism, in its entirety, 19½ H. P. The application of a single motor of sufficient capacity showed that for driving all motions of crane with no load 2.85 H. P. were absorbed.

To lift eight tons 4 ft. per minute 6.5 H. P. additional.

To lift four tons 9 ft. per minute, 7 H. P. additional.

Cross travel 27 ft., .67 H. P. additional.

Total power absorbed by motor when lifting eight tons equals 11.1 H. P., a saving of 43 per cent., a result probably larger than would be shown with a crane of modern design.

As to what system is best for these miscellaneous services, a comparison of the various systems shows there are circumstances to which each is suitable, and that they do not admit of being dealt with always on the principle of economy, but rather of suitableness; each must be decided by the conditions governing it. The successful use of electricity for stationary cranes of all types distributed, as is common, through all parts of a building yard or freight station, has a most promising future. The operation of all machinery from a central power plant is always most economical when transmission to distance is not too expensive. The transmission to long distances by means of steam compressed air or water have all serious objections. The use of electricity transferred within reasonable distances is most satisfactory and inexpensive. The simplicity of a motor, its ease of connection, power and effectiveness are, certain of recognition for services of this kind, and the maintenance of long lines of expensive high-pressure pipe in freight stations and many shop uses cannot but show unfavorably in comparison when moderate lifting is the desideratum.

It is true of many shop appliances that their use is intermittent, and it is particularly the condition with crane machinery, and their adaptation to work should be rapid. Separate motive power involves the attendance of an engineer, and, while the advantage of electricity as a motive power is not pronounced with machines constantly in service, for intermittent work the advantages are evident.

The use of several motors for the operation of the different motions of an electric traveling crane was made successful in England prior to their general introduction in the United States. In all general types of traveling cranes the transverse movement of the trolley and the hoisting gearing are actuated by longitudinal shafts running the length of the girders or by high speed ropes. These necessitate tumbler bearings, accurate shaft alignment or sheaves with boxes, and all involving deterioration and friction.

With the substitution of a motor connected directly with the trains of hoisting gearing and another connected with the traversing mechanism; shafts, tumblers, sheaves, etc., are unnecessary, wire conductors being the substitute, the deterioration of the motors is slight and confined to few parts. Such a substitution is likewise made with the traveling mechanism, and the use of all clutches obviated. Such a design is shown in fig. 8. It is essentially electrical, all motions through the motors being reversible and independent. Experience has shown, with such mechanisms that, through the controlling rheostat, variations of speed for all motions are most easily accomplished. It is evident with such results that these changes greatly simplify the mechanism for the necessary motions of a traveling crane. With a double-trolley machine, as shown, the elimination of parts for the many motions required is still more marked, five motors there independently operating both trolleys and traveling, the variation of speed and running being controlled as before through the rheostats. For very rapid hoisting with light loads a second and rapid speed is given. These remarks apply to machines with single and double trolleys used alone. The combined use of two electric cranes for one transferring operation introduces other important conditions.

Cranes lifting or transferring together necessarily must lift and transfer at the same speeds, and, while one operator working one crane may adjust his switch for a certain speed, it is extremely difficult for the other to adjust his to the same, a most important objection for consideration. No satisfactory remedy in such cases has been proposed; a different design, however, corrects it. With rope or shaft driven cranes speeds are constant and clutches control them. The substitution of one powerful motor for driving all mechanisms otherwise driven by the rope or shaft gives the effect, when done at a uniform speed, of a constant motion for all parts. An electric crane so designed is in all details similar to a rope or shaft driven machine, and two machines may work together or singly.

To all the parts necessary with the ordinary machine there has been added a motor; we therefore add nothing in simplicity.

In the selection of a design there can be no doubt of the great simplicity with electrical power of the single or double trolley crane and its effectiveness and accuracy of operation. While there are advantages with the one-motor system (necessary when two cranes are to be worked together), yet with the uses of all the mechanisms necessary with other motive power, the use of electricity with such cranes is not so pronounced.

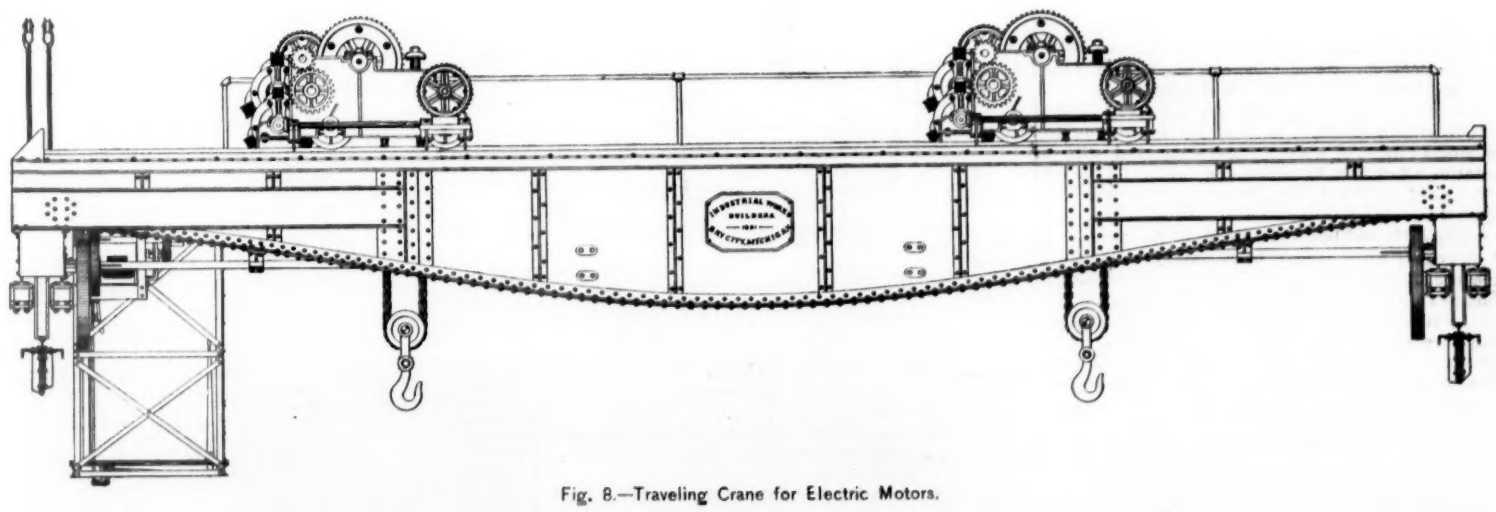


Fig. 8.—Traveling Crane for Electric Motors.

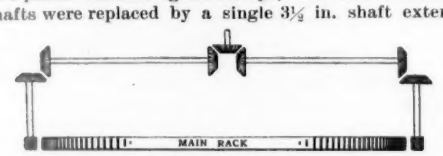
TO BE CONTINUED.

Swinging Drawbridges by Electricity.

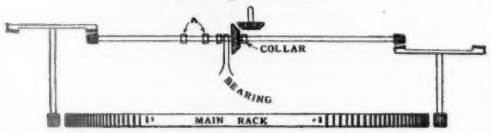
An interesting departure from former practice has recently been taken in operating drawbridges at Chicago. The Rush Street Bridge, which was the first of those erected with four driveways, has been swung by steam power from a two-cylinder reversing engine, 8 in. × 12 in., using steam at from 80 to 90 lbs., the operating plant being located between the trusses above the roadway, the engine-house being on cross girders between the main posts.

The draw span is 240 ft. long and 59 ft. wide, with a turntable 48 ft. in diameter, and weighs about 800 tons. This has just been equipped by the Thomson-Houston company with a motor and gearing for swinging the span by electricity, the current being taken from the mains of the Arc Light & Power Co., and brought under the iron bed by two No. 4 cables, extending from the south abutment to the centre pier, sunk in a deep 4 ft. trench dredged across at this point. They pass under the rack and roller track to the centre, where they are connected with two copper rings, which are attached to, but thoroughly insulated from, the centre stationary cone on which the bridge revolves. These copper rings encircle the stationary cone and are above the horizontal plate to which the radial roller rods are attached, the cables being brought up from below by drilling a half-round hole down through the edge of the cone, and just inside the inner circumference of the plate, which is preferable to bringing them up through the centre of the cone, as in this case they are in plain view and may be easily reached should occasion require. Against these rings two trolleys are held by means of springs, and in this way the current is taken off, to the motor. By this trolley connection one is enabled to swing the bridge in either direction, or as many times in one direction as desired, without breaking the circuit.

Originally the vertical shaft passing down through the centre of the middle truss was fitted with a mitre at its lower end, driving the horizontal shaft, which was in two parts. In making the change, these two horizontal shafts were replaced by a single 3½ in. shaft extend-



Gearing for Steam.



Gearing for Electricity.

ing entirely across the turntable, and in order to preserve the correct motion in the pinions revolving around the rack below the turntable, the large flat rack gears at the upper end of these key shafts were reversed, one being placed above and the other below the main shaft pinions.

The 25 H. P. motor is hung on the main horizontal shaft at *A*, and supported at the armature by a small bracket bolted to the girder below. This, with the cushioning it receives from the rubber blocks on the top of the bracket, allows the motor to ride smoothly and with very little noise. The intermediate cut gears attached to the sides of the motor, as well as the motor itself, are of the same construction as those used by this company on the trucks of their electric trams.

One wire (No. 6) is brought down from the switch to each end of the armature, and four wires from the rheostat to the field, one to either end and one to each of the loops. As is customary, carbon brushes are used.

On the deck of the bridge, between the posts of the middle truss, in a sheltered cabin are the controlling devices, which consist of a hand wheel connected with a rheostat by a lock belt, by which the bridge is started and the speed regulated; also a hand lever for reversing the direction. Incandescent lamps are placed in this controlling cabin and below the deck at the motor, so that every part which it may be necessary to examine during the night is perfectly illuminated. These lamps also act as a safeguard to enable one to determine by the eye the condition of the circuit for operating the bridge. As this current is transmitted from the central station, about three-quarters of a mile distant, by cables running through conduits under the streets, it is necessarily well guarded and protected from harm. The electromotive force of the current received for the motor is about 500 volts, there being but slight loss between here and the power house, and the normal current used by the motor is about 35 amperes in turning the span.

Should it be wished to connect the steam shaft with the horizontal shaft at any time, that may be done by changing a small shaft collar from in front of the mitre gear to the back of this mitre, between it and the bracket, thus engaging the vertical and horizontal mitres. This operation occupies from 1½ to 2 minutes.

The full equipment has been thoroughly tested under all conditions, being operated on one occasion during a very severe wind and electric storm and on another occasion moving the bridge when loaded with heavy traffic trains, such as pass at this point. This latter was especially severe, but was undergone without the slightest difficulty. It might be said that this particular test mentioned was unexpected and not at the solicitation of the company.

The speed was designed to be the same as formerly, by the steam apparatus, and the movement of the bridge by the new method has proved to be much superior to that by steam, as the motor is able to do its maximum work at the moment of starting, while with a steam engine the reverse is the case, the engine doing its minimum work where the maximum is required; also in starting the bridge with steam equipment there is considerable jerk and then the bridge moves with much jar and vibration, due to the engine being placed so far above the centre of gravity. In the case of the motor which is below the centre of gravity, this oscillatory motion is entirely obviated, and from the turning on of the current the movement is smooth and even.

By equipping a bridge with a motor a great amount of superfluous weight is done away with, such as the large bridge engine house overhead, the engines, boilers, water tanks, coal bunkers, etc., which make of themselves considerable weight, and add their proportionate amount to the expense of moving the structure. Also, there is not the objection to the handling of coal, dumping the ashes into the river, and the annoyance of repairs which a steam plant is subject to in such cramped-up quarters. With a motor there is nothing that can happen to it, no matter how serious, which cannot be remedied during the bridge hours, and without perceptible delay. The cost of operating the bridge will be much less, as there will be no fires or engines to look after, and one controlling man can attend to the apparatus. This is the largest drawbridge which it was ever attempted to operate by electricity. The installation was made by the stationary motor department of the Thomson-Houston Company, the plan having been conceived and worked out by its manager, Mr. Nichols, under whose personal supervision the construction was done. They have equipped in a similar manner the Grand Avenue bridge at Milwaukee, which, however, is much smaller, weighing only about 200 tons, and which was formerly worked by hand power.

Portable Electric Drill Presses.

The accompanying cuts illustrate two types of portable drill presses which are driven directly by electric motors. The machine shown by fig. 1 is fitted with a motor of about .4 H. P. capacity, and is intended to drill holes

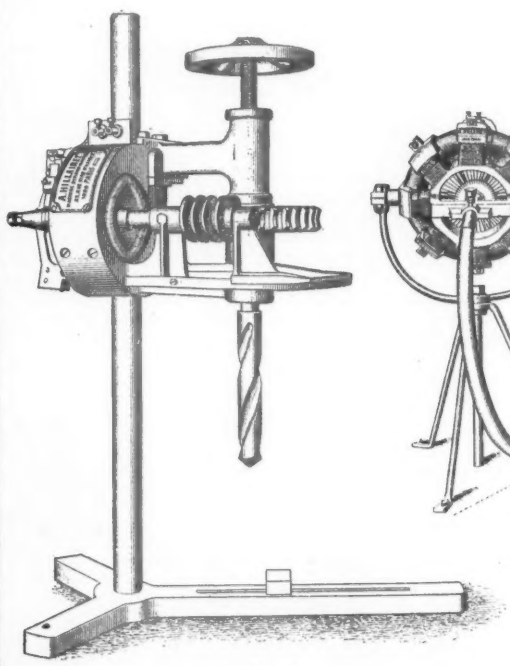


Fig. 1.

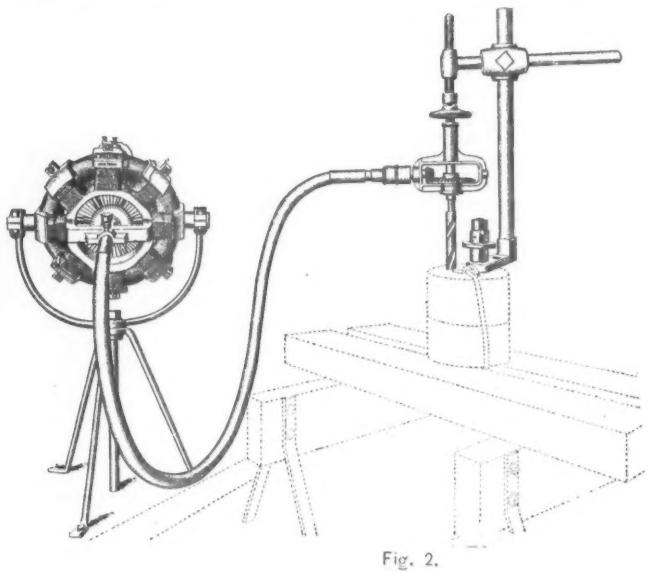


Fig. 2.

PORTABLE ELECTRIC DRILL PRESSES.

up to 1 in. in diameter in steel plates. The total weight of the machine is given in the journal of the *Société des Ingénieurs Civils* as 77 lbs. (35 kg.). It is said that with four of these tools the 60,000 holes in the protective deck of the Greek cruiser "Hydra" were drilled in 60 days.

Experience with Viaducts Over Railroad Tracks.*

The following paper is reproduced entire from the *Journal of the Association of Engineering Societies* as being a record of actual experience, and therefore of especial value:

During the 16 years of construction and maintenance of viaducts over the railroad tracks in our city, considerable opportunity has been afforded to collect valuable experience, some of which is probably of sufficient general interest to deserve bringing before the club. This is the object of this paper, not a description or history of the structures.

The type adopted in the building of the first bridges—on Twelfth and Fourteenth streets—was that of wooden and iron trestles. The latter consists of Phœnix columns on stone foundations, longitudinal girders, iron floor-beams and sidewalk brackets and wooden floor and railing. The design of the iron work deserves special mention, inasmuch as with a minimum amount of material great rigidity has been obtained. Even under the increased loads of the electric roads there is not the slightest vibration or tremor to be detected, while the weight of the ironwork in the bridge (width of roadway 20 ft., two sidewalks 6 ft. wide each) is only 435 lbs. per foot of bridge. The Phœnix columns have lately commenced giving way, the rivet heads breaking off and the columns opening, some from top to bottom. As the metal is only ¼ in. thick, a spacing of rivets of 12 in. was too great.

The ironwork of the north end of the Twelfth street bridge being very much exposed to the smoke of locomotives, which at the Union Depot stand directly underneath the bridge, before the trains pull out, afforded a good study of the effect of coal smoke. It has suffered to a considerable extent. The web sheets of the plate girders and floor beams have been reduced in thickness in places as much as $\frac{1}{16}$ of an in., at other places no reduction could be measured. The effect has evidently been unequal and is much more perceptible on angles and flange plates, where the metal has been eaten away as deep as ⅛ of an inch.

In such places it seems impossible to sufficiently protect ironwork by paint, and the lesson to be drawn from the above, is that it is very much in the interest of the city to raise the work up as high as possible above the tracks. A clear height of 36 ft., as we have on the Grand avenue bridge, obviates this danger. Whenever an increase of clear height is not feasible, it is good policy to design all ironwork with an additional thickness of metal of ⅛ in. all around.

As not less than six cases of derailments have happened, where cars or engines have knocked out or broken iron columns of Twelfth, Fourteeth and Jefferson avenue bridges, and where in every instance it has been a case of remarkable good luck that no serious accident ensued, this question may be considered to be an interesting one. It may be said that there is no excuse for derailments, that a system of guard rails would remove this danger, but the fact is that derailments do frequently occur and I am not quite sure whether in a great switchyard they can ever be entirely avoided.

Four out of these six derailments were caused through derailed freight cars or freight trains, which were being backed up by the engine in making up a train. This class of accidents can be provided against by building the foundation piers to such a height that the body of the cars cannot strike the ironwork, *i. e.*, to a height of at least 3 ft. 6 in. above rail, the force not being sufficient to knock down even a small stone pier. The other two accidents happened through a train running at full speed jumping the track. It is of course impossible to state just what size stone pier could withstand such a shock, but I have the impression that there is certainly no post, built of iron or steel, in existence which would outlive it. We have been told in the discussions of Mr. Theodore Cooper's paper on American R. R. bridges by several advocates of riveted trusses, that a lattice girder will withstand a derailment, while a pin connected truss will not. Such statements appear to me unwarranted. If struck by a derailed train, the one is as liable to go down as the other, and so will any structure supported by metal columns whenever the latter comes in the path of a locomotive.

The question of foundation for piers and retaining walls has presented a number of interesting problems.

The streets being intersected by sewers, gas and water pipes it has been the rule to arch these over in such a manner that the necessary excavation for renewal or repair can be made without injury to the stonework. Where heavy piers are close to a sewer, as for instance on the Eighteenth street bridge, the piers have been carried down to the depth of the bottom of the sewer. It has also been found advisable as a rule to go deeper with all the foundations than the frost line, as the laying of pipes, the building of sewers, changes of the grade of railroad tracks, foundations of new buildings, especially near the retaining walls of the approaches, etc., may otherwise endanger the foundations. In building the long retaining walls of the ap-

* By Carl Gayler, Member Engineers' Club of St. Louis. Reprinted from the *Journal of the Association of Engineering Societies*.

proaches, experience has led us to risk settlements in preference to building heavy foundations. Portions of the north approach of Eighteenth street bridge have settled 6 in. and more during construction, some parts of the approach walls of Twenty-first street bridge nearly as much. In such cases it is much cheaper, and answers the purpose as well as to raise and reset the coping stones and point up the walls. This, of course, does not apply to the foundations of the superstructure, where settling has to be avoided as much as possible.

The trouble experienced with the foundations of the south main pier of the Grand avenue bridge are instructive enough to be described more fully. This pier is located directly north of Mill Creek sewer. The ground was known through borings to be a soft, black clay, easily permeated by water. On account of the proximity to the large sewer it was considered objectionable to use a pile foundation and a footing of concrete 45 ft. wide, 80 ft. long and 11 ft. thick, giving an area of 3,600 sq. ft., corresponding to a pressure of not quite 3,000 lbs. per sq. ft. under the weight of the pier itself, and of about 4,000 lbs. per sq. ft. under the total load of the structure, was considered as good a foundation as could be obtained without resorting to pile driving. To give as much time as possible for settling, it was also stipulated in the contract, that after the foundations up to the grade line of the street had been built in the fall, no work should be done on the upper portion of the pier until the following spring. In case of settlement it was intended to make up for it in the thickness of the bed plates after completion of the pier. But one point was not duly condered which soon made itself felt. The concrete foundation of the pier was built up against the side of the sewer, the resistance against settling was therefore greater on the south than on the north side of the pier, and a consequent unequal settling of the pier took place, which was a source of anxiety and mortification to the engineer. In building up the pier above ground, the courses of masonry had to be built higher on the north than on the south side, so as to get finally the middle of the top of the pier vertical over the centre of the foundation. Regular measurements of these settlements were taken and the curve plotted, horizontal ordinates representing the time, vertical ordinates the settling. Toward the completion of the pier the curve had very closely approached to a horizontal line. A similar but lighter curve was observed during the erection of the superstructure and since the completion of the bridge no further settlement could be detected. The north main pier of Grand avenue bridge showed no perceptible settlement, and is an example on a pretty large scale that a pressure of 4,000 lbs. per sq. ft. on our yellow clay is safe.

In regard to floors we have gone through the usual evolution from wooden joists and planking to wooden block pavement on planks carried by steel stringers. Permanent floors seem, after all, on account of their great weight, to be a thing of the far future. As steps in this direction may, however, be designated the proposed granitoid sidewalks on the new Twenty-first street bridge and the covering of the Forest Park Boulevard bridge over the tracks of the Wabash R. R., with Portland cement concrete arches between steel girders.

The question of the general design of future bridges across railroad tracks has probably, as in other large cities, narrowed down to the following general features:

1. Stone piers at or near railroad tracks.
2. Spans of from 150 to 250 ft. length over the tracks.
3. Single intersection trusses carrying the floor. Two trusses, one on each side of the roadway and separating the same from the sidewalks, should always be used in preference to three trusses, which latter arrangement is in use in Chicago. The experience with the Eighteenth street bridge should forever exclude the cantilever system on account of its lack of rigidity.
4. Short spans on iron columns wherever tracks cannot be laid.
5. The use of mild steel to the exclusion of wrought iron, without, however, increasing the maximum unit strains.
6. Limitation of minimum thickness of metal (except in railings) to three-eighths of an inch. This latter rule is even more important in the case of city viaducts than for railroad bridges, as they are more exposed to smoke or dirt, and therefore harder to be kept clean and in paint, and as attachments in the shape of brackets or stirrups may be made at almost any portion of the bridge for carrying pipes, wires, posts, signs, etc.
7. A floor system as substantial as possible; whenever the necessary funds can be obtained a floor with a concrete foundation should be used, at least for the shorter spans.

Creamer's System of Car Ventilation.

The illustration herewith represents a part of the inside of an ordinary car with a new system of ventilation devised by Mr. W. G. Creamer.

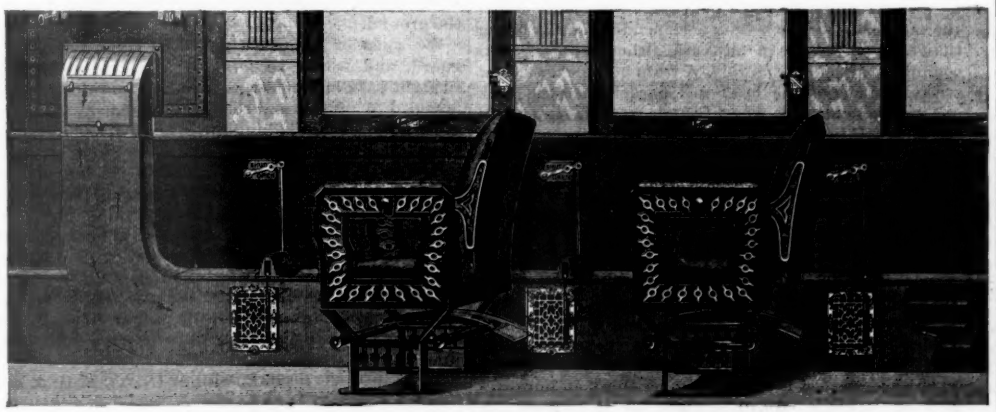
The fresh air is admitted through a double screen at each end of the car (on the sides). It is driven in by the movement of the car, and thence down to the steam pipes, which are inclosed. In the inclosure, openings are made provided with registers.

The fresh screened air is warmed by contact with the hot pipes and then discharged into the car through the registers. The inflow of fresh air is regulated by the handles in the screen casing and also by each register.

It is also suggested to keep the steam pipes in summer filled with ice water or some freezing mixture and thus keep the car cool.

In the clearstory of the car are placed self-reversing exhaust ventilators on the outside of the car. On the inside are registers to regulate the temperature in cold weather, the valves of which are all connected to one rod with a lever handle at the end of the car, so that the whole can be adjusted by one movement instead of annoying passengers by working each sash separately. It will be seen, however, that for a large portion of the year the registers will need no attention whatever, as the ventilators reverse themselves.

Forty cars are now running on the Long Island Railroad with this improvement, also 12 on the Brooklyn Bridge.



CREAMER'S SYSTEM OF VENTILATING PASSENGER CARS.

Pneumatic Riveter for Bridge Work.

In a description of the new Memphis Bridge, published in our issue of June 26, mention was made that the field riveting of the lower chords was done by a special pneumatic riveter. We give, herewith, illustrations showing the general construction, design and manner of operation of the riveter used. It was designed by Mr. Charles Vogel, M. E., acting under general instructions from Mr. Morison. The dotted lines show the position of bridge chords.

Fig. 1 is a sectional and side elevation; fig. 2 is a front elevation, and fig. 3 is a rear elevation of the riveter. The three figures show quite clearly the nature and operation of the machine. The whole mechanism is suspended from above by means of a chain *A* and connecting fork *B*, the cylinder and attached riveting arms being kept in a plumb position by means of the adjusting hook and rod *a'* connecting the top of cylinder with the suspension chain. The suspension fork *B* takes hold at the centre of motion of the riveting arm *C*, the fixed arm *D* being rigidly attached to the bottom of the operating cylinder.

In the operation of the riveter, motion is given to the piston within the cylinder by means of air pressure. The movement of the piston is transmitted by its rod to a main lever E moving in a fixed centre bearing formed upon the fixed arm *D*. A downward movement of the lever *E* causes an upward movement of the link *F* and an opening movement of the riveting arm *C*, as shown by dotted lines. An upward movement of the lever *E* causes a downward and thrust movement of the link *F* and a closing and riveting movement of the lever *C*, as shown by full lines. When the link F is just entering and is at an exact horizontal position, the heaviest home thrust and final pressure is being brought to bear to close the joints and finish the riveting. To control and adjust this movement and prevent the link *F* from passing below the horizontal line, when at work, the connecting pin between the link *F* and the riveting lever *C* is made excentric in its bearing, and a close adjustment for the action of link *F* is effected by its revolution. When in proper position, a set screw *c'* jambs it fast. The value of this simple means of adjustment can readily be appreciated.

The operating cylinder is 12 inches in diameter, and 18¼ inches stroke.

Fig. 1.

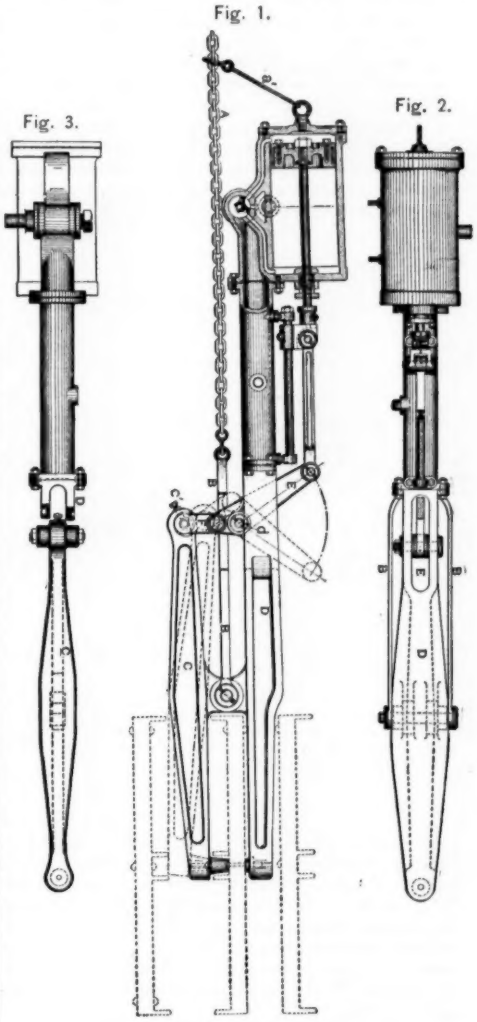


Fig. 3. Fig. 2.

Portable Pneumatic Riveter.

Designed and Constructed for the Memphis Bridge.

Fuel Premiums on the Mexican Central.

In our account of the Johnstone compound locomotive, on the Mexican Central, mention was made of the plan of basing premiums to enginemen and firemen arranged by Mr. F. W. Johnstone, Superintendent of Motion Power on that railroad, which includes an allowance for differences in track as well as loading. This system has been in use since June, 1888, with the following results:

The units of work made per ton of coal and cord of wood since 1887, when the award system was inaugurated, compared with the year, before the system was used, are as follows:

Units of work obtained from one ton of coal; 1887, 270.7; 1888, 286.7; 1889, 305.5; 1890, 281.5.

Units of work obtained from one cord of wood: 1887, 216.6; 1888, 221.6; 1889, 257.2; 1890, 234.6.

TABLE No. 1.

Total resistance per gross ton of trains running 15 miles per hour over various grades (curves compensated).

0.0	per cent.	7.41	1.0	per cent.	26.91	2.0	per cent.	46.41
0.1	"	9.36	1.1	"	28.86	2.1	"	48.36
0.2	"	11.31	1.2	"	30.81	2.2	"	50.31
0.3	"	13.26	1.3	"	32.76	2.3	"	52.26
0.4	"	15.21	1.4	"	34.71	2.4	"	54.21
0.5	"	17.16	1.5	"	36.66	2.5	"	56.16
0.6	"	19.11	1.6	"	38.61	2.6	"	58.11
0.7	"	21.06	1.7	"	40.56	2.7	"	60.06
0.8	"	23.01	1.8	"	42.51	2.8	"	62.01
0.9	"	24.96	1.9	"	44.46	2.9	"	63.96
						3.0	"	65.91

The "unit of work" is one which has been selected by Mr. Johnstone in order to make it a fair comparison between the work done by different engines under different conditions.

This unit is the work done in hauling 100 gross tons over one mile of straight and level track at so low a rate of speed that the resistance due solely to speed is *nil*.

The best performance on each division entitles the engineer and fireman to a prize of $15, and the engineer and fireman making the next best performance, a prize of $10.

The folowing method is used in reducing grades and curves to an equivalent straight and level track. The resistance per gross ton hauled on a straight and level track at low speed is assumed to be 6 lbs. per ton. The resistance per gross ton on any grade due to the grade is divided by six, and the result multiplied by the length of the grade gives the equivalent length of level track. If curves are not compensated, one-half lb. per degree of curvature is added to the resistance due to the grade before dividing by six.

It is evident that for different speeds the total resistance will vary; therefore, it is necessary to figure out the distances separately for trains running on different schedules. This has been done for the Mexican Central as shown by the following tables:

Table No. 1 gives the total resistance per gross ton of freight trains running 15 miles per hour over various grades where all curves are compensated. From this table can be calculated the equivalent straight and level track between stations for freight trains running in both directions.

Table No. 2 shows the total resistance per gross ton of passenger trains running 30 miles per hour over various grades with the curves all compensated. From this table can be calculated the equivalent straight and level track between stations for passenger trains averaging 30 miles per hour.

TABLE No. 2.

Total resistance per gross ton, of trains running thirty miles per hour over various grades (curves compensated).

0.0 per cent.	11.23	1.0 per cent.	30 73	2.0 per cent.	50.23
0.1 "	13.18	1.4 "	32.68	2.1 "	52.18
0.2 "	15.13	1.2 "	34.63	2.2 "	54.13
0.3 "	17.08	1.3 "	36.58	2. "	56.08
0.4 "	19.03	1.4 "	38.53	2.4 "	58.03
0.5 "	20.98	1.5 "	40.48	2.5 "	59.98
0.6 "	22.93	1.6 "	42.43	2.6 "	61.93
0.7 "	24.88	1.7 "	44.38	2.7 "	63.88
0.8 "	26.83	1.8 "	46.33	2.8 "	65.83
0.9 "	28.78	1.9 "	48.28	2.9 "	67.78
				3.0 "	69.73

TABLE No. 3.

Per cent. of level track equivalent to various grades.

4%	of down	grade	or	over	taken	as	20%	of level track.
3%	"	"	"	"			40%	" "
2%	"	"	"	"			60%	" "
1%	"	"	"	"			80%	" "
0%	"	"	"	"			100%	" "

Table No. 3 shows the straight and level track taken as the same for all speeds, equivalent to down grades of different percentages. This table is used to make allowance for the steam lost while descending grades.

All these equivalents in level and straight track are determined by taking the grades from the profile of the road, first in one direction and then in the other, on the methods just explained. After determining these equivalents between stations, a table is made up to facilitate calculation of the units of work between such

TABLE 4.

SHOWING THE LENGTH OF EQUATED TRACK BETWEEN STATIONS ON THE SECOND DIVISION OF THE MEXICAN CENTRAL RAILWAY—BOUND NORTH.

FREIGHT.

Stations.	402	416	432	448	461	475	493	496	521	537	564	585	600	615	624	644	665	681	696	706	719	736
383	40.0	49.3	62.9	92.8	144.2	157.3	236.5	247.4	259 4	285.1	333.3	363.3	386.2	411 1	423.7	468.5	548.0	631.3	666.9	725.4	735.4	740.7
402		9.3	22.9	52.8	104.2	117.3	196.5	207.4	219.4	245.1	293.3	323.3	346.2	371.1	386.7	428.5	508.0	591.3	626 9	685.4	695.4	700.7
416			13.6	43.5	94.9	108.0	187.2	198.1	210.1	235.8	284.0	314.0	336.9	361.8	377.4	419.2	498.7	582.0	617.6	676.1	686.1	691.4
432				29.9	81.3	94.4	173 6	184.5	196.5	222.2	270.4	300.4	323.3	348.2	363.8	405.6	485.1	568.4	604.0	662.5	672.5	677.8
448					51.4	64.5	143.7	154 6	166.6	192.3	240.5	270.5	293.4	318.3	333.9	375.7	455.2	538.5	574.1	632.6	642.6	647.9
461						13.1	92.3	103.2	115.2	140.9	189.1	219.1	242.0	266 9	282.5	324.3	403.8	487.1	522.7	581.2	591.2	596.5
475							79.2	90.1	102.1	127.8	176.0	206.0	228.9	253.8	269.4	311.2	390.7	474.0	502.6	568.1	578.1	583.4
493								10.9	22.9	48.6	96.8	126.8	149.7	174.6	190.2	232.0	311.5	394.8	430.4	488.9	498.9	504.2
496									12.0	37.7	85.9	115.9	138 8	163.7	179.3	221.1	300 6	383.9	419.5	478.0	488.0	493.3
521										25.7	73.9	103.9	126.8	151.7	167.3	209.1	288.6	371.9	407.5	466.0	476.0	481.3
537											48.2	78.2	101.1	126.0	141.6	183.4	262.9	346.2	381.8	440.3	450.3	455.6
564												30.0	52.9	77.8	93.4	135.2	214.7	298.0	333.6	392.1	402.1	407.4
585													22.9	47.8	63.4	105.2	184.7	268.0	303.6	362.1	372.1	377.4
600														24.9	40.5	82.3	161 8	245.1	280.7	339.2	349.2	354.5
615															15.6	57.4	136.9	220.2	255.8	314.3	324.3	329.6
624																41.8	121.3	204.6	240.2	298.7	308.7	314.0
644																	79.5	162.8	198.4	256 9	266 9	272.2
665																		83.3	118.9	177.4	187.4	192.7
681																			35.6	94.1	104.1	109.4
696																				58.5	68.5	73.8
706																					10.0	15.3
719																						5.3
736																						

points as the trains run without changing weight. The number of loaded and empty cars and changes in the number of cars in the train are taken from the conductor's reports. It has been assumed by Mr. Johnstone, in the absence of better data, that it is accurate to consider all loaded cars to weigh 24 tons gross, and to take two empties as equal to one load. The weight of the engine and tender is also taken into account in calculating the units of work.

Table No. 4 shows how the second division of the Mexican Central road is equated to an equivalent straight and level track for freight trains and passenger trains

TABLE 4*A*.—PASSENGER.

Stations.	416	475	585	706	736
383	56.4	190.1	430.7	853.9	868.7
416		133.7	374.3	797.5	812.3
475			240.6	663.8	678.6
585				423.2	438.0
706					14.8

bound north. Along the top and left hand sides of this table are the numbers of the stations, and at the intersections of the columns in which these station numbers are marked is a figure which represents the equivalent straight and level track between these stations; and in using the table the total gross tons of train, including engine and tender, between two stations is determined, This is multiplied by the tabular number, found as above. between those stations, and representing the equivalent straight and level track, and the result is divided by 100. The quotient then represents the units of work per formed by the locomotive in traveling between the stations. A performance sheet (not reproduced) shows the work done, running expenses and fuel used.

Where railroads are using a high class of locomotive equipment, there is probably no way of obtaining so great a saving in fuel used as to offer fuel premiums to the engineers and firemen. Much, of course, depends upon the system used. Almost any system will result in a saving on a road that has never had a premium system. Recently the Pennsylvania road has changed its premium system to a more comprehensive one, which includes a consideration of the necessary differences in the actual economy of the locomotives when hauling heavy and light loads. The increased skill and care of the engine men in operating, and the comparative uniformity of handling the locomotives, which were obtained by experience, made apparent the unfairness of a system that assumed that locomotives worked with equal economy under wide variations of loading.

New England Roadmasters' Association.

The Ninth Annual Convention of the New England Roadmasters' Association opened at the American House, Boston, Aug. 19, at 2 p. m., with President W. E. Clark (Vermont Valley R. R.) in the Chair.

The election of officers resulted as follows: *President*, F. C. Clark (Housatonic); *Vice-President*, C. B. Lentell (Boston & Albany); *Secretary and Treasurer*, G. L. R. French (Boston & Maine); *Chaplain*, E. W. Horner (Central Vermont). *Executive Committee:* W. E. Clark (Vermont Valley); A. C. Stickney (Boston & Maine); E. K. Post (New York, New Haven & Hartford); F. Holbrook (New York, New Haven & Hartford); together with the President, Vice-President and Secretary.

The following is an abstract of the report of the Committee on

TRACK JOINTS.

The only joint in common use on new work at present, in this country, is the angle bar. The angle bar is comparatively cheap, andthis, with its many other good qualities, has led to its almost universal use on T rails. For a light traffic it does well, and we doubt if much greater expense is warranted for a joint under light traffic, but we must all admit, that it is far from making a perfect joint, though with proper care, if well proportioned to start with, it comes nearer filling the bill than anything else that your committee has seen used.

The following points we feel sure will appeal to trackmen: (1) Without good ballast one cannot have good joints the year around, no matter what style of joint is used. (2) No matter what fastenings are used, good joints cannot be kept without a considerable amount of labor. (3) One of the most provoking defects in any joint fastenings is the fact that often it is made from poor material. (4) Oftentimes angle bars are bent laterally in cutting, and if the outside bar is the heavier, as is usual, it will knuckle the joint in or out; the inside plate and the rails taking the form of the bent outside bar, and no amount of spiking in at the joint will keep rails in line. In such cases the bars should be taken off and straightened, or nearly so, with a hammer. (5) The imperfect fit of any joint fastenings is a source of annoyance and poor riding track, for no bolts will remain tight long if all the strain comes on them, as must be the case when the angle bar does not fit closely under the rail head. (6 We believe a suspended joint is better than a supported one in any case, although one of your committee dissents from this. A train going over a joint strikes the end of the head rail harder than the back one, consequently the wheel bounds from the end of the rail and strikes the rail a blow some twelve inches ahead of the joint. A suspended joint has a tie under this point and on double track roads you can tamp this tie harder than the back tie, thus avoiding the surface bending of the rail at this point. On single track roads, on heavy grades, you often see the rails bent in this same way. The head rail in the direction of fastest running being the one that is bent. (7) All joints should provide proper means of securing rails to ties to prevent running and preserve proper expansion. A suspended joint gives two ties to do this instead of one. (8) No joint fastening can ever prevent low joints entirely, however perfect it may be, but we think an improvement on the angle bar can be made for most uses. (9) The angle bar fills the bill for lateral pressure, keeping joints in good line, but expecting a joint to stay up by clamping it between two angle bars, especially when the clamping is done by bolts, is poor mechanics, and not good common sense. A joint needs support underneath more than sideways, and why not give it the support it needs by putting a plate under it, or some other support? If a plate is used, it should be so made that it will be part of the joint so that it will not allow the rail to play up and down, forming an anvil of the plate, thus causing the rail to batter and the joint to rattle, and constant wear of the parts in contact. (10) Joints should have as few parts as possible. (11 In conclusion we would say, use as long rails as can be well handled. Whatever joints you have, keep it bolted up tight and your joints will show the little extra attention at once.

Committee: F. HOLBROOK (N. Y. N. H. & H.). J. R. PATCH (Conn. Riv.). C. S. LANE (N. Y., N. H. & H.).

DISCUSSION.

A. C. STEVENS (Boston & Maine): The worst trouble with joints is from lack of help to keep them surfaced up. I believe in suspended joints with ties properly spaced, and think the report covers the whole ground.

J. W. SHANKS (New London Northern): The difficulty is lack of help in many instances to keep joints in proper shape. Another thing, many of our roads are not ballasted properly. The nearer perfection we can reach in roadway the less trouble we will have with joints.

W. E. CLARKE (Vermont Valley): I would like to inquire of Mr. Shanks if angle bars are heavy enough and of good quality?

Mr. SHANKS: We use the Samson bar, plain. I think there is more trouble in quality of bolts and nuts. We find bolts made of an inferior grade of iron, with the thread poorly cut and the nuts too thin; ⅝ bolts should be 1 in. or 1¼ in., although I do not think it well to increase the size of bolt, because you would weaken the rail.

W. F. ELLIS: I am in favor of a two-tie suspended joint and would keep the angle bars as short as possible. For a 75 and 80-lb. rail I would recommend a ⅞-in. bolt made of the best material. I have advocated bolts and nuts without a nut lock. The bolts never broke and I never stripped my thread. I was wrong as it took too much wrench work to keep them tight.

F. HOLBROOK (N. Y., N. H. & H.): What is the necessity for increasing the size of bolt when there is less strain in the bolt with larger rails? Or, in other words, the larger the rail the less strain on the bolt.

R. P. COLLINS (Old Colony): We use the 40-lb. steel angle plate with a ¾-in. bolt. We have no trouble with breakage and do not think it necessary to increase the size of bolt.

E. W. HORNER (Central Vermont): With a 56 lb. rail we use the Samson plain bar, with a one-tie joint, and are much pleased. We are now laying 72-lb. rails. I am satisfied that with light rails and bars the bolt has been the weak point in the joint. I think that with larger rails bolts should be of better quality. I am in favor of suspended joints, a short angle bar 22 or 24 ins. long but do not want slots in them. I think that the coming joint of perhaps 10 years hence will be bent out 1½ in. perhaps and then bent under and so fitted to clasp the base of the rail, thus avoiding splitting of rails through the holes.

Mr. NEVINS (Maine Central): I have put under a third tie—a good tie under the joint. We have traffic of 30 trains a day besides specials, and we have no trouble in keeping joints up with three ties. We have a smooth joint with four holes, rails are square as when put in and there is no dip. The higher you get the rail and the deeper you get the strap the better joint you get. We use ¾-in. bolt, and find some very poor ones. I should say that ⅞-in. bolts with ⅞ nut would be better and made of best quality, if we want good results.

The following is an abstract of the report of the committee on

FENCES, CATTLE GUARDS AND CROSSINGS.

We recommend at stations and thickly settled portions of a town or city, a board fence 6 ft. high with moulded cap on top and barbs on top of the cap. Boards to be ½ in. apart, and 6 ins. wide. A braided wire fence with posts set about 10 ft. apart and four or more strands of wire, fastened to posts, the wires to be not more than 12 ins. apart, and top wire to be not less than 4 ft. from the ground.

We consider a surface guard as safer than the pit guard, and would recommend a guard consisting of straight parallel iron strips about ½ in. thick, securely fastened to a frame and the frame fastened to the ties or other cross timbers, filling the space between the rails excepting flanging, and also the space from outside of rail to cattle guard fences, the ends of the iron strips to be beveled off so that anything dragging from a train would not catch on them.

We think the best way to dispose of grade crossings is to change them to either over or under grade. The next best, to fill the space between the rails with 3-in. southern pine plank, leaving flange way for the wheels, and also put two planks outside of each rail, and where there is more than one track fill in between with broken stone or good coarse gravel.

Committee: F. E. SIBLEY (N. Y., N. H. & H.). E. E. STONE (Boston & Albany). E. K. POST (N. Y., N. H. & H.).

WEAR OF ENGINE DRIVERS.

The committee appointed to report on the question to what extent can wear of engine driving wheel tires be allowed before general economy demands them to be repaired? find they have a very important subject to consider, and will not be able to present the report to the

Association and to proper officers of railroads as forcibly as safety and economy demands.

The rule to be ¼ (one-fourth) of an inch, the extreme not to exceed ⅜ three-eighths) of an inch from the proper surface and bevel of wheels as adopted.

We do not even consider them safe to be run on the road after passing the extreme mentioned, for, while trailing through spring rail, frogs and split switches, the extra flange on outside of the wheels is liable to press the loose rail of a frog and the bent rail at the point of split switches out of line, so a wheel would drop down on to ties and cause a wreck, and, as a matter of economy, a few badly worn wheels passing daily over the road will cause the renewal of many frogs and switches in three or four years that otherwise would last twice that length of time, or even more in many cases.

Do not see any economy to run an engine after passing the extreme ⅜ of an inch, and if this rule could be adopted and followed out it would very much reduce the breakage of frogs, switches and rolling stock and also add safety to the running of trains.

Committee: { GEO. W. BISHOP (Fitchburg). E. H. BRYANT (Old Colony). J. W. MCMANAMA (Fitchburg).

BEST METHOD OF SECURING RAILS TO TIES.

We know of no better method than with good spikes, and for that purpose would recommend the Goldie steel spike as being superior to any we know of. For holding guage on curves would recommend that the track be spiked wider than standard guage, one-sixteenth of an inch for each degree of curvature not to exceed one inch. We do not believe in braces, except on very sharp curves where it is impossible to hold the track without them. Your committee cannot speak from experience on tie plates, but think they would be advantageous in prolonging the life of soft-wood ties and holding track to guage on curves.

Committee: { R. HYLAND (Fitchburg). R. P. COLLINS (Old Colony). A. C. STEVENS (Boston & Maine).

EXHIBITS.

Bryant Sawing Machine Co., Bryant & Barbey, sales agents, 79 Milk street, Boston, Mass., full-sized Bryant rail saw in working order, with samples of cuttings.

Dilworth, Porter & Co., Limited, Pittsburgh, Pa., samples of the Goldie spike in soft steel.

Pettibone, Mulliken & Co., Chicago, Ill., sample of the Jenne track jack and Alkins forged steel rail braces.

Ruffner & Dunn, Schuylkill Falls, Philadelphia, Pa., samples of their nut locks.

Weir Frog Co., Cincinnati, O., photographs and blue prints of frogs and switches; model of automatic switch stand with three-part clutch; samples of steel die-formed rail braces.

Tile Surface Railroad Cattle Guard Co., Tiffin Bank, Garden Grove, Iowa, model of the common-sense tile surface cattle guard.

Standard Nut Lock Co., Newark, N. J., samples of the standard nut lock.

George Nevins, Brunswick, Me., and A. A. White, Portland, Me. Blue prints and models of the Nevins' flange scraper and Nevins' patent foot guard.

The National Surface Guard Co., Chicago, Ill. Full size national iron surface cattle guard.

Sherburne & Co., Boston, Mass., agents for Morris Sellers & Co., Chicago, Ill. Samples of the Samson bar and Greer's patent railroad track spike. Sample of the Emerson rail bending and straightening machine.

Continuous Rail Joint Co., of America, Newark, N. J. Samples and blue prints of the continuous rail joint.

Anderson Rail Joint Co., Chicago, Ill. Full sized sample of the Anderson rail joint.

The National Lock Washer Co., Newark, N. J. Samples of the national washer.

Deane Steam Pump Co., Holyoke, Mass. Samples of the Deane steam pump.

Fisher Rail Joint Works, Trenton, N. J. Samples of the Fisher combination joint.

Ramapo Wheel and Foundry Co., Ramapo, N. Y., and the Ramapo Iron Works, Hillburn, N. Y. Blue prints and drawings of switch stands and track equipment, and samples of the Ross brake shoe.

Fairbanks, Morse & Co., Chicago, Ill. Full size hand-car, push car, velocipede, Barrett track and bridge jacks. Blue prints of water tanks, steam pumps, stand pipes and the Emerson rail bending and straightening machine and contractors' supplies.

W. H. Phillips, Jenkingtown, Pa. Illustration of the Phillips patent rail bending machine.

Pullman Parlor Cars.

There are just being completed a number of parlor cars at the Pullman shops which in elegance of finish are thought to surpass all previous efforts by this company. Three are constructed with four double bay windows on either side, the main sill beneath the windows being straight, as usual, on the exterior, but with the sash let in at one side so as to form the requisite angle with the line of the car.

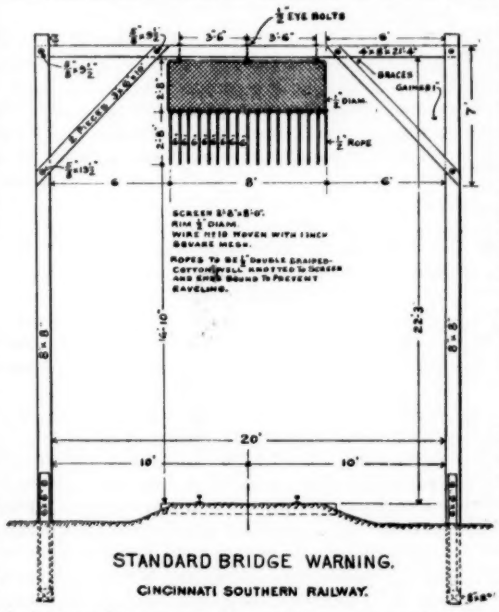
The outside finish is similar in design to the regular sleeping cars, and fitted with vestibule ends. These cars are equipped with the three sets of hose pipe, brake, signal and heating. The lighting is done by the Pintsch system, with eight lamps to the car, four in the main compartment and two at either end, besides the vestibule lights.

The floor plan is such as to give a ladies' room at the opposite end from the smoking-room. This is very elegantly furnished in mahogany and plush, and is a pleasant feature. All the chairs are made of white hair cloth, and are much more comfortable in shape than are usually found in this class of coach. Besides the regular 20 revolving chairs, are two wicker, movable chairs at either end, cushioned with the same material, the former provided with pillow hassocks. The mirrors and grill work at the ends of the long drawing-room are deserving of particular attention. All metal fittings are of the Persian bronze style, and the package racks sustain well the general effect. The smoking-room has two doors, one into the hall or passage, and the other into the washroom, so that either may be kept open as desired, the settee being so built with rollers that it may be swung around in front of whichever door is closed. The partition between the smoking-room and main drawing-room is of heavy bevel glass, with silk curtains gathered across on rods. The smoking-room and ladies' room will seat five each.

In all, twenty of these cars have been built, four for the Baltimore & Ohio for their "Cincinnati Limited" out of New York, and sixteen for the Pennsylvania, for their runs out of New York to Washington and elsewhere. These orders were filled in two lots, they differing simply in some of the smaller details.

Bridge and Tunnel Warning.

It is a queer fact that one of the tough problems that railroad officers have to meet, and on which lawmakers and philanthropists expend a great deal of gray matter, is how to keep brakemen and switchmen from killing themselves. One would suppose that the functions of the ordinary bridge warning are so well understood by brakemen and that the usefulness of this contrivance is so very great to them that they would respect it and try to maintain it. On the contrary, it is a common trick of brakemen to wrap the ropes around the cross-arm by giving them a swing as the train passes, so that the next poor brakeman who comes along on the top of a



STANDARD BRIDGE WARNING.

CINCINNATI SOUTHERN RAILWAY.

freight car does not get the warning. To prevent this species of playful barbarism Mr. G. B. Nicholson, Chief Engineer of the Cincinnati, New Orleans & Texas Pacific, has devised the warning shown in the accompanying cut.

The particulars are so fully given on the engraving that it hardly requires description. A wire netting has been interposed between the cross beam and the hanging ropes. When these warnings were first put up leather thongs instead of ropes were used, but these thongs, having a great many uses, were cut off short by the brakemen, so that cotton rope is now used.

TECHNICAL.

Manufacturing and Business.

The Lackawanna Iron & Steel Co., of Scranton, Pa., is to roll a quantity of steel ties for the Morrell Metallic Railway Tie Co. These ties are to be laid on the Morris & Essex Division of the Delaware, Lackawanna & Western and on the main line near Paterson, N. J. After the tests on this road some of the ties will be laid on the New York, Susquehanna & Western.

The Lidgerwood Mfg. Co., of New York, has sold about 13 of the new type of heavy hoisting engines which was introduced less than a year ago. A two-drum hoisting engine of the new type is working in the quarries of the Vermont Marble Co., at Proctor, Vt. The engine runs two derricks, hoisting 20-ton blocks easily 162 ft. in a minute and a half, the steam pressure being only about 60 lbs., and 300 ft. away from the engine.

The Industrial Works of Bay City, Mich., has very lately contracted with the Grant Locomotive Works for the entire equipment of traveling cranes which will be used in the new plant at Chicago. These will consist of one crane with a capacity of 40 tons, one of 20 tons, and one each of 12 and 10 tons. All will have an extended span, and possess the very latest features in crane construction, each being operated in all of its parts by electricity. The Industrial Works are making quite a specialty of crane work, their designs embracing almost every variety of machinery required in this direction for any use. Among recent shipments was one of the most powerful transfer cranes yet built, for the Rio Grande Western, of capacity for lifting 30 tons and of steel construction throughout. Others recently sent out have been a shop crane for the western terminal of the Northern Pacific; and heavy station cranes for the Philadelphia & Reading, to be erected in Philadelphia; and for the line of the Cincinnati, Hamilton & Dayton. In process of construction at their shops are a number of large cranes for different uses. These include a very complete wrecking outfit for the East Tennessee, Virginia & Georgia; self-propelling and powerful steam yard crane for the Solvay Process Co., of Syracuse, N. Y., with several accompanying steel cars; two shop cranes for the G. A. Gray Co. of Cincinnati, O.; and several cranes of different types, each of 20 tons capacity, building for the Pittsburgh & Western, Southern Pacific, and Chicago, Rock Island & Pacific. The company is also erecting a 70-foot electric transfer table for the Wagner Palace Car Co., at Buffalo, of special design, and has just finished a similar table, operated by steam, for the St. Thomas shops of the Michigan Central.

The Central Car Repair & Mfg. Co., of Chicago, has been incorporated with a capital stock of $625,000 to manufacture railroad cars and agricultural machinery and implements. The incorporators are Henry R. Pebbles, Norman S. Patton and Reynolds Fisher.

Two large Colliau furnaces are being constructed for the Grant Locomotive Works, of Chicago, by Byram & Co., of Detroit. This company recently supplied the United States Government with a cupola furnace, for use at the Watertown arsenal, Watertown, Mass., the third one built for the government.

The Lima Machine Works, Lima, Ohio, have orders from the following parties for Shay patent locomotives and cars: Alleghany Lumber Co., of Olean, N. Y., one 62-ton Shay locomotive and 50 logging cars; the Southern Equipment Co., of Chattanooga, Tenn., 4 Shay locomotives and 24 logging and tip cars; Geo. M. Dilley & Son, Palestine, Tex., 2 locomotives and 10 logging cars; H. Schimmelfeng & Son, Instanter, Pa., 5 cars; Poplar Bluff Lumber Co., of Poplar Bluff, Mo., 3 cars; L. T. Sloan, of Grant, Tex., one 13-ton Shay locomotive and 4 logging cars; T. H. Quinn, of Quinton, Pa., 2 logging cars; E. K. Kane, of Kane, Pa., 10 logging cars; Wild River Lumber Co., of Island Pond, Vermont, one 35-ton Shay locomotive and 8 logging cars; H. S. Southard, of Bradford, Pa., one 13-ton Shay locomotive; C. N. Nelson Lumber Co., of Cloquet, Minn., one 17-ton Shay locomotive and 25 logging and flat cars. They have made recent shipments of locomotives and cars to the following parties: Yawkey & Lea, Hazelhurst, Wis., one 20-ton locomotive and six log cars; United Lumber Co., Portage Creek, Pa., one 35-ton locomotive; Pioche Consolidated M. & R. Co., Milford, Utah, one 10-ton locomotive; Little Book Cliff Railroad Co., Grand Junction, Colo., one 30-ton locomotive; Emporium & Rich Valley Railroad Co., Emporium, Pa., one 50-ton locomotive and 18 logging and flat cars; Sample Lumber Co., Hollis, Ala., one 28-ton locomotive and four log cars; Tiadaghton & Fahuastalk Railroad, Tioga, Pa., one 35-ton locomotive; Jos Dessert Lumber Co., Mosinee, Wis., one 20-ton locomotive and 24 log cars; Moore & Smith Lumber Co., San Francisco, Cal., one 28-ton locomotive; E. S. Collins & Co., Kelso, Wash., one 20-ton locomotive; G. W. Campbell & Son, Kane, Pa., one 35-ton locomotive; Greenway Lumber Co., Greenway, Ark., one 10-ton locomotive and six log cars; W. W. Wadsworth, Wadsworth, Ala., one 20-ton locomotive; Messrs. Gasler & Co., Philadelphia, Pa., one 10-ton locomotive; the Jacksonville Santa Fe H. R. P. Co., Jacksonville, Fla., one 17-ton locomotive and 10 tip cars; Wm. Carlisle & Co., Atchison, Kan., one 13-ton locomotive and seven log cars.

Iron and Steel.

The old Taylor Iron Works of High Bridge, N. J., was dissolved Aug. 10, and has been succeeded by the Taylor Iron & Steel Co., with an authorized capital stock of $1,000,000. The company has acquired from the firm in Sheffield, Eng., the rights to manufacture in this country the steel made under the Hadfield patents. Particular attention will probably be given to the manufacture of solid steel car wheels. Mr. Chrystie, foundry superintendent, is now in England learning the details of the system. Mr. W. J. Taylor, General Manager of the Taylor Works, will also leave for England shortly to arrange the plans. Some of the Hadfield wheels have been sent here, and under severe tests made at the High Bridge plant, showed remarkable strength. The directors of the Taylor Iron & Steel Co. are: Lewis H. Taylor, High Bridge, N. J.; Luther C. Voorhees, New York; James Moore, Elizabeth, N. J.; Henry M. Home, Boston; Robert E. Jennings, Jersey City, and William J. Taylor, Chester, N. J. The officers are Lewis H. Taylor, President; William T. Taylor, General Manager; Robert E. Jennings, Vice-President; T. F. Budlong, Secretary and Treasurer.

B. F. Holmes, of 45 Broadway, New York City, is said to be at the head of an Eastern and Canadian syndicate which is negotiating for the establishment of the plant of the Columbia Steel Car Co. to manufacture steel cars near Desplaines, Ill., where an option has been secured on 1,000 acres of land.

The new electric light plant for the Pawtucket Gas Co., at Pawtucket, R. I., is being built by the Berlin Iron Bridge Co. The dynamo-room will be 60 × 150 ft., the engine-room 58 × 78 ft., and the boiler-room 60 × 80 ft. The side walls will be of brick, with iron roof covered with corrugated iron. The whole plant will be built by the Berlin Iron Bridge Co., after the plans and specifications of Remington & Henthorn, of Providence, R. I.

The Jasper Iron Co., recently chartered, has been organized by J. H. Baker, of Alleghany, Pa., with a capital stock of $600,000, of which $197,000 is paid in. The company proposes to erect a plant at Jasper, Tenn., with new machinery to manufacture car forgings, bar iron and steel, etc.

The W. H. Warren Machine Tool Works at Worcester, Mass., have received a contract for building machinery for the Watervliet Arsenal at West Troy, N. Y., which amounts to $25,000.

The plans adopted for the new buildings of the Hanover Foundry & Machine Co., at Gettysburg, Pa., include a machine shop 90 × 140 ft. and a foundry 60×70 ft., both of brick.

The Buffalo Steam Forge Co., which has been operating the Sayre Forge, at Waverly, N. Y., has decided to remove the latter works to Buffalo, where the main plant is located.

The Rail Market.

Steel Rails.—There is little change to note either in quotations or the condition of the market. The Western mills expect a large business in the fall, but some of the Eastern mills talk of closing their works entirely. The quotations are $30.75@$31 in the East; $30 at mill at Pittsburgh and $31.50@$32 at Chicago.

Old Rails.—About 2,000 tons of old iron rails have been sold at Chicago for $23@$23.50, and old steel rails are quoted at $14@$16. At Pittsburgh, old iron rails are quoted at $23@$23.50.

Car Couplers.

It is officially announced that all conflicting claims and controversies between the Thurmond and Standard Car Coupling companies have been satisfactorily adjusted; the suit between the parties has been dismissed. Each party and company has the right to manufacture and sell, or cause to be manufactured and sold, or authorize others to manufacture and sell, couplers of the kind heretofore manufactured and sold by it, under its own patents, freed and discharged from all claims of infringement that have been or can be made by either party against the other.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The railroads at last have their opportunity. It has been certain for a good while that we should have a tremendous wheat crop, and it has been probable that the corn crop would be a large one, while other cereals are all promising great yields. It has been known, too, that European crops were short. Therefore it has been safe to count on a heavy traffic at sustained prices for the railroads, as well as for the farmers. The Russian order prohibiting the export of rye after Aug. 27 precipitated a boom in prices, and wheat went up to $1.08 in Chicago (for December) last Saturday. Monday it closed at $1.03, and Wednesday the closing price was $1.02 for September and $1.04¼ for December. The trading has been immense in volume. It is not safe, however, to assume that this boom will continue long *as a boom*; but it is as certain as anything can be that the railroads will have all they can do to handle the crop, and that farmers will get fair prices. It has long been held that "dollar wheat" in Chicago means good times. Therefore, as we said at the outset, the railroads have their opportunity. It only remains to be seen whether they can hold out and carry the crop at profitable prices.

In the *Electrical World*, under the head "A Peculiar Performance," is an editoral note which seems intended to reflect upon the Rapid Transit Commission in that they invited suggestions, and having received them from divers persons, they now ignore those persons, intrusting their own engineers with the preparation of their plans, aided by "outsiders, of high reputation in their respective lines of work, but none of them in the least degree well known as designers of underground work, etc." We have supposed that the purpose of the Rapid Transit Commission in inviting suggestions, as it did, was to have the benefit of the thoughts of all citizens of New York who had given this very difficult problem any serious consideration, and to afford an opportunity to any engineer who might have any entirely original and practicable scheme to bring it forward. As might have been anticipated, and as probably was anticipated, nothing of this new and remarkable character was produced; those parts of various schemes which were practicable were old, and those which were decidedly original were impossible. Engineering is in fact the judicious use of the results of experience in designing and executing the problem in hand. Sometimes this effort is illuminated by a ray of genius which develops some entirely new method; but the most we can count upon is a small advance along the line of progress indicated by previous works of a similar character to that about to be undertaken. We do not recall any modern instances in which volunteered engineering has been successful in obtaining employment or recognition; but many volunteers find ample compensation for their efforts in the publicity given to their names and plans, when suggestions are invited. For our own part, we think it highly desirable that all volunteer efforts at engineering should receive the same amount of recognition that all the other amateur suggestions do, at such general hearings as those held by the Rapid Transit Commissioners, and we must highly commend the business-like manner in which they are proceeding with the work intrusted to them, by the employment of engineers in whom they and everybody else can have confidence.

Passenger Fares and Passenger Earnings.

The contribution of "Argus" in our issue of July 24, and that of "J. I. H." in this issue, raise the question of the general principle which underlies reduced rates for excursions or other special trips, and we are asked, "What is the principle at the basis of rate [passenger] reductions?" "What limit can be put to excursions?"

In very general terms it is easy enough to answer these questions. Passenger rates should be reduced whenever net earnings can be increased; but this must be done without discriminating unjustly between persons or places. But this is in very general terms indeed. The difficulty comes in the application of the general principle.

It must not be supposed that the traffic men have avoided the field of passenger business and cultivated that of freight business simply because they have not thought of the fact that passenger earnings could be increased. And it must not be thought that the slow growth of passenger movement and the great growth of freight movement can be accounted for by assuming that one field has been neglected at the expense of the other. From 1882 to 1890 the freight movement of the railroads of the United States increased 101 per cent., and the passenger movement only 67 per cent. But freight earnings increased 52 per cent. and passenger earnings 46 per cent. So while the passenger movement has not been developed in anything like the ratio of the freight movement, the rate of increase of earnings has not been so greatly different.

Now, would the railroads have profited by a greater development of passenger business at correspondingly reduced rates? And has the public the same interest in increasing passenger travel and decreasing passenger rates that it has in procuring these conditions in freight business? An unqualified affirmative answer cannot be made to these questions. No doubt in a great many special instances net earnings can be increased by lowering rates, but each special case must be examined by itself. It is not clear that the public would be benefited by general reductions in passenger rates. One difference between freight business and passenger business is this: The movement of freight is a necessary part of the economy of production and consumption. The movement of passengers is, to a considerable degree, mere luxury. Material must be moved to the mills and products to the markets, and the world's wealth is increased in some ratio to the economy with which this is done. But time and money spent in traveling must often be time and money lost, so far as the wealth of the community goes. The investment is non-productive to a far greater degree than money invested in moving freight.

But every one will grant that there is room on every railroad for some profitable increase of travel by special rates, and one way of making more money is by judicious excursions.

If we take a particular excursion train the profit seems large. A train to Niagara Falls, carrying 800 people at $5 each, and costing $1 per mile for 900 miles (though the actual additional outlay may not be more than half of $900), nets the company $3,000 we will say, a margin large enough to allow of a good deal of scalping before becoming unprofitable. But the many excursions now being run to Niagara Falls from the central group of states are fast demoralizing the whole passenger tariffs. If these trains should continue to be run regularly and often, they would inevitably compel a readjustment of all passenger fares; yet there can be no doubt that these excursions carry large numbers of persons who would not have paid the regular fare at all. In short, traffic has been "created," and this is an end in itself. How far the volume of traffic would keep up if excursions were made permanent features it is impossible to estimate. It must be largely a matter of experiment. On the one side is the fact that people, particularly in the large cities, are taking short trips from home more frequently every year. On the other hand, experience shows that during a rate war the regular travel is not increased corresponding to the reduction.

There are other reasons, too, why excursions must be arranged with judgment if they are to pay. There is the matter of equipment. How many additional coaches and engines would be required to handle frequent excursion trains, each road can best figure out for itself; but the cost would be chargeable to capital, and just now capital is not easy to get. In some cases an increase in the investment at terminals will also be necessary, although generally the excursion traffic may be timed to use the terminals when the regular traffic is slack. When to the elements of increased expense we add the loss to the regular ticket revenue certain to accrue, if excursions become regular and frequent, we can well understand that railroad officers hesitate before committing their roads to a policy where the increase in expenses is certain, and the increase in net earnings (though perhaps sure in the gross) is somewhat doubtful.

The public bearing of excursion fares is as complicated as the question of railroad economy. Prominent traffic officers fear that the Inter-state law will be invoked by some traveler if he has to pay more fare than an excursionist in the same seat. Where excursions are arranged from local stations to some commercial centre, there is sure to be an outcry on the part of local or nearby merchants, retail or wholesale, that the railroads are taking customers from them and carrying just so much trade to the city.

Beyond all this the scalper must be considered. As things are now, this personage is one of the great obstacles to any system of passenger fares which shall discriminate between one traveler and another, no matter how different the circumstances in each case may be.

There are other fields than that of excursion travel that are not worked to their utmost, as, for example, the means of loading suburban trains in the direction against the heavy travel, morning and night. Family tickets and reduced rates for short excursions into the country are some of the ways of doing this. In short, the true way to develop passenger business is to devise means of getting people to travel who would otherwise stay at home, and to load existing trains in their light direction, and to do this without interfering with existing business or rates. How all this is to be done the enterprising passenger men are always scheming, and we can tell them nothing that they do not know; but obviously it is to be done chiefly by the application to passengers of the principle that has worked so well when applied to freight, of charging according to value of service—or, if one chooses, "what the traffic will bear."

The Ideal Railroad Track.

He would be a bold man who should assume to say how the perfect railroad track will be built; but it is well from time to time to make a "round up" of knowledge and opinion. It serves at least to keep the younger men thinking, and helps to keep them from wasting effort on ideas that have been exhausted by others. What follows is written for such purposes, and not as a solution of one of the most complicated of engineering problems.

At the last convention of the American Society of Civil Engineers Mr. T. C. Clarke offered what he conceives to be the solution of the problem; that is, longitudinal stringers of metal. The substance of his paper will be found in the *Railroad Gazette*, May 29. It will soon be published complete in the *Transactions* of the Society. Mr. Clarke gave no design of a track built according to his ideas, and, in fact, did not claim to have worked out the details. He showed the Hohenegger (Austrian) track, which is admittedly defective.

The advantages of the longitudinal bearing system as stated by Mr. Clarke are:

The rail joints are supported on the continuous bearing; the joints in the sleeper are covered by the rail; therefore vertical movement is minimized. The rails are supported throughout their entire length, and may be made of "less depth and sectional area in the lower flanges than at present. The metal so saved can be put in the head of the rail, where it is most needed." With equal stiffness of track the rail proper may be much lighter, and therefore the metal scrapped will be less than with the present construction.

On the other hand, longitudinal sleepers have disadvantages which have caused them to be abandoned nearly everywhere. They were used in the earliest construction of railroads in the United States and in England, and have been quite extensively tried in Germany for the past 20 years. In fact, as late as 1885 over 3,000 miles of track laid on metal longitudinals was reported in Germany. But the longitudinal system has been universally abandoned. We understand that it is not renewed in Germany, and probably the Great Western of England is the only important railroad which still keeps longitudinal sleepers as standard.

Some of the disadvantages of the longitudinal system are:

It is difficult to preserve the line and gauge. Drainage is interfered with, not only by the longitudinals

themselves, but by the packing of the ballast beneath them. Closely related to this objection is that of unequal tamping on the two sides of the track, causing oscillation. We do not know how important this point has been found in practice, but the difficulties of preserving good line and of drainage have been found very serious. Another objection to the longitudinal system, particularly with metal stringers, would be the difficulty of preventing creeping. No matter how stiff the track, its tendency to creep down hill would be hard to check, and would throw the track out of line.

The constructive complications on curves, and at switches, turnouts and crossings, are serious, and the cost of maintenance has, we understand, actually been found greater on longitudinal than on transverse sleepers, where both have been tried under the same conditions. Finally, the system proposed by Mr. Clarke, the Hohenegger, gives but about 67 per cent. of the bearing in the ballast that is obtained in the ordinary cross-tie construction in the United States.

The solution of the joint problem would doubtless be easier with longitudinal sleepers, but apparently it would be secured at too great cost. The idea of saving a part of the steel which must be scrapped when the rail head is worn out is not so valuable as it looks at the first statement. In fact, the scrap value of old steel rails is now from 50 to 60 per cent. of their first cost; and as new uses for them are found, as they surely will be, this value will increase. If, as Mr. Clarke seems to assume, 20 per cent. of the weight of rails could be saved, the ultimate saving on scrapped material would be about 8 per cent., or, for a road with 75-lb. rails, 10 tons per mile. At present prices this would be $320 per mile—a sum that would not go far toward paying for the stiff longitudinal that must be used to allow this reduction in weight of rail. This will show also one defect in the theory of a compound rail which is brought up with great regularity year after year.

If the ideal track is not to be found in a reversion to the longitudinal system, it is suggested that it will be found in the use of the present T-rail and metal cross-ties. We see much more reason to think well of this conclusion. The metal tie has had considerable vogue in the last 10 years. Its use is increasing, and the details of its form and fixtures are improving steadily.

Apart from the question of first cost and cost of maintenance, the chief advantages claimed for metal ties are, the permanence of gauge, the possibility of fixing the gauge in the shop, the security of fastenings and the general gain in safety. The chief disadvantages are the noise, the difficulty in shifting and replacing rails, and the impracticability of shimming. The advantages are not, however, peculiar to metal ties. With a tie plate and a sound wooden tie the gauge can be maintained with practical certainty. It is probably not true that the gauge can be fixed in the shop before ties are shipped, for variations in rolling will not allow the gauge to be determined from the rail flange. On the other hand, a wooden tie gives great facility in renewing rails, is elastic, and is much less noisy than a metal tie. The noise can, however, be largely overcome by covering the metal tie well with ballast.

The relative cost of metal and wooden cross-ties cannot be absolutely determined for all countries and conditions. Even in this country, where timber is still cheap, the life of cross-ties must be prolonged against decay by treatment, and against wear by tie plates, or the price will before many years be seriously increased. In this direction, however, much can be done before we are driven to metal ties for economy, and it is quite possible that by such improvements, and by planting forests for tie timber, the day of economical use of metal ties may be postponed many years.

The cost of maintenance on the railroads of Germany and Holland seems to be, in the long run, in favor of metal ties; although even there it is not proved that, including interest charges, the metal ties are cheaper. Undoubtedly, for countries where tie timber is very costly, or deteriorates very fast, metal ties are on the whole cheaper.

Our judgment is that in the United States, for many years to come, the cheapest and best track will be rails of the present type on wooden ties. But the ties will be treated for preservation against decay, and tie plates will be used on every tie. The spikes will probably be still further improved, and possibly they may give place to wood screws or bolts. This, however, we doubt, for there is an immense convenience in the use of a spike that can be quickly drawn and driven. The rail will be of increased weight and stiffness of section, and in all probability higher in carbon than anything now used in this country.

Work on the Hudson River Tunnel has been stopped for lack of funds. There now remains about 1,600 ft. of work to be finished before reaching the shaft on the New York end and this 1,600 ft. will probably be the most difficult section to drive. The top line of the tunnel rises to within 5 or 6 ft. of the river bottom and the silt is assumed not to have resistance enough to withstand the air pressure. It is proposed to dump a bed of clay over this portion of the river bottom, of sufficient thickness to retain the air pressure and then dredge it out after the excavations are completed. Mr. Hutton, the Chief Engineer, does not regard the cracks that have appeared in the iron lining as of any great consequence or as materially injuring the tunnel. The cracked plates are among the first that were put in and are thinner than those now used. These plates were also used with rough edges and had no middle flanges, whereas the new plates have their edges planed and make a very tight joint. The settling that has occurred is attributed to construction. The shield cuts a slightly larger hole than the outside diameter of the lining, so that when the latter is first put into position it does not entirely fill the hole. This settling action extends back some thirty feet from the shield, but when it has once taken place and the tunnel is down to a bearing, nothing more of the kind takes place. It was the intention to inject grouting around the tunnel, as was done in the case of the London Subway and the St. Clair Tunnel, but this was found to be impossible, owing to the density and pressure of the silt. It is estimated that when work is once more resumed it will take about 16 months to finish the tunnel.

At last it is announced that the ceremony of the inauguration of the St. Clair Tunnel will take place September 19. The directors of the tunnel company are satisfied that the work on the approaches is in such a condition that it is safe to fix that early date. We have no doubt that the ceremony will be a fitting celebration of the completion of this manificent work, which stands as a noble monument to the courage and skill of the men who projected it and carried it through. The rumor is that Sir Henry Tyler is already talking of a second tunnel under the river, which he says would not cost nearly as much as the first one because of the accumulation of plant and experience. This rumor, however, we take with a good deal of reserve, for it seems probable that the tunnel now about completed will be sufficient for all the present wants of the Grand Trunk. A year ago, when we visited the tunnel, the estimate of the officers of the Grand Trunk was that there would be about 70 trains a day, of all classes, to be passed through it. The total length of the tunnel and cuttings is 11,600 ft. and the grades are two per cent. As it has but a single track, it *must* be worked much of the time as a single block section 2¼ miles in length, and considering the heavy grades, it is doubtful if more than one train would be admitted at a time, even in one direction. Therefore the capacity of the tunnel will be limited to the number of trains that could be passed through an absolute block section of 2¼ miles. But there would seem to be no difficulty in passing 70 trains a day, even with the delays necessary to change engines at the ends of the tunnel.

The White Star liner Teutonic is now in the lead as a record breaker, she having made the passage to Sandy Hook from Roche's Point in 5 days 16 hours and 31 minutes, which is 1 hour and 37 minutes better than the Majestic's record breaking run of two weeks ago. The record of these two voyages is as follows.

	Teutonic.	Majestic.
1st day	460	470
2d "	496	501
3d "	505	497
4th "	510	501
5th "	517	491
6th "	290	317
	2,778	2,777

The Teutonic now has the best record for one day's run, which is 517 miles, to the 515 miles made by the City of Paris during her fastest day.

The New York *Sun* gives the following interesting table of fast trips:

In 1866 the steamers began calling at Queenstown, since which time the record has been taken from there.

Year.	Ship.	D.	H.	M.
1866	Scotia	8	2	48
1873	Baltic	7	20	9
1875	City of Berlin	7	15	48
1876	Germanic	7	11	37
1877	Britannic	7	10	53
1880	Arizona	7	7	23
1882	Alaska	6	18	37
1884	Oregon	6	11	9
1884	America	6	10	00
1885	Etruria	6	5	31
1887	Umbria	6	4	42
1888	Etruria	6	1	55
1889	City of Paris	5	19	18
1891	Majestic	5	18	8
1891	Teutonic	5	16	31

An offer of M. Eiffel to build a tower for the Columbian World's Fair has called out a spirited remonstrance from several members of the Western Society of Engineers. They protest against the imputation upon American ingenuity and skill which would be conveyed were M. Eiffel's offer to be accepted, and we are bound to say that they are right. We question the wisdom of attempting any great structure which shall be simply wonderful as a *tour de force*. It seems as if the true spirit would indicate that whatever buildings are erected should be remarkable for the combination of beauty, utility and economy, and skillful adaptation of plans and material, for these are the elements which, after all, combine to make a really great engineering work. But if the World's Fair must have a structure which exceeds anything else merely in its colossal dimensions, whether up and down or crosswise, certainly there are plenty of engineers in America who are entirely competent to design it, and we agree with the Chicago men that it would be not only a reflection upon our own engineers, but a very serious mistake of policy, to go abroad for designs.

The Northern Railroad of France has recently added a "correspondence room" to its Paris station, where passengers waiting find desks and pens and ink, and can procure from automatic apparatus paper, envelopes, postal cards and postage stamps. It has also established an information bureau where time-tables of all French and other European railroads are kept, and tickets of all kinds are sold. But the most popular, perhaps, of its innovations is an office for the receipt of packages sent from the Paris shops to passengers who are going to take a train at that station. When you buy anything at a shop, you can have it delivered at the Northern station, the shop giving you what is equivalent to a check for it—a number, corresponding to the number on the package. On giving up the number at the station and paying two cents, or one cent per parcel per day, you receive what you have bought, so that the trouble of shopping, for out-of-town residents, is reduced to a minimum. The leading retailers of Paris were very glad to make an arrangement with the railroad for checking the goods and sending them to the station. These arrangements, it strikes us, ought to be adopted in the larger cities of the United States. The commuter, and especially the commuter's wife, would be glad to be spared the toil and ignominy of lugging parcels through the streets, especially at a rate so cheap.

The announcement now made that the Prussian State Railroads have adopted the Westinghouse quick-acting brake in place of the Carpenter, has some significance for Americans. The Carpenter brake, with an electric attachment, was entered at the last Burlington tests, and made some fine stops. At that time it was confidently announced that the Carpenter brake would be put on the market in this country, to compete for the freight equipment business. Since then, at intervals, the same statement has been repeated with considerable circumstantiality. If, after all, the Westinghouse has captured the Carpenter stronghold, people here who have been holding back orders to wait for more competition will probably decide that they had better buy what is actually offered than to wait longer for such an uncertain competitor. This, with the great railroad earnings now in prospect, ought to make the brake business boom again. Although, to tell the truth, the number of people who have held back orders, hoping that Carpenter would come and cut prices has probably not been very great.

The August Crop Report of the Department of Agriculture makes the average state of corn 90.8, a falling off of two points. This decline has been confined almost entirely to the states of large surplus, and is due to dry weather. The report of spring wheat makes the average state 95.5, an improvement of a point and a half over July. In the states of large production the average is higher. The report says: "The July report showed a condition of 96.2 for winter wheat at the time of harvest. This with the present condition of spring wheat indicates a product of wheat but little short of the capabilities of the soil under the most favorable conditions." The condition of oats is 89.5, which indicates a medium crop. The state averages of rye and barley are high; California returns 100. The reports of buckwheat and potatoes are also very good. The August returns of cotton are 88.9, practically the same as last year; the crop is quite generally late and the plant small.

As far as the production of pig iron tends to show the prosperity of a country, we should be in a fairly prosperous state. The weekly capacity of furnaces in blast at the end of July was about 176,502 tons. This gives a probable production for the month of 757,366 tons, or at the rate of over nine million gross tons per year. The iron market, however, stays dull, although there is a feeling that it will shortly improve. The record of the Soo Canal has been broken by the passage of 1,529,553 tons of freight during July. The shipments of iron ore through the canal were larger for both May and June, but less than for July of last year, and the ore shipments from Lake Superior to Aug. 1 were only 1,540,293 net tons, as compared with 2,540,293 tons up to the same date in 1890. The lake docks, however, are being cleared of the ore which loaded them, and ore is being hurried forward for consumption during the winter and early spring.

The Directors of the Union Pacific have completed a plan for carrying the floating debt of that company. It is to issue six per cent. notes running three years, secured by collateral to be deposited with Drexel, Morgan & Co. The debt provided for amounts to about $19,000,000, and it is said that more than half of the creditors have assented to the plan.

NEW PUBLICATIONS.

The Train Wire. A Discussion of the Science of Train Dispatching. By J. A. Anderson, with an Introduction by B. B. Adams, Jr. Second edition, revised and enlarged. New York: The *Railroad Gazette*. 1891. Pp. 152, 12mo. Price $1.25.

This well known work on train dispatching has been entirely rewritten by its author, and now appears in a revised and enlarged form.

The first eight chapters are discussions of the general principles, and treat of: Train Dispatching; The Dispatcher; The Operator; The Order (with photographic illustrations of very good and very bad manuscripts); The Manifold; The Record; The Train Order Signal; The Transmission. Chapter IX. contains the standard code of rules for the movement of trains by telegraphic orders, with comments on each rule, giving valuable practical advice as to its application in special cases, and making its purpose and necessity clear. Chapter X. contains the standard forms of train orders, and the remaining chapters treat of rules as to rights of tracks, of numbering switches, etc. The book is complete and exhaustive as a practical handbook and course of instruction for an inexperienced operator, and there are few superintendents or dispatchers who may not learn much from Mr. Anderson's long experience in this department.

A few extracts from the introduction to the book, written by one of the editors of the *Railroad Gazette*, will perhaps best explain the particular characteristics of the work:

"The first edition of this book was the first thorough and precise essay on the subject which had appeared, and it stated the principles of dispatching in substantially the form since adopted by the General Time Convention. The inception of the work resulted from the author's labors, several years earlier, in revising the rules of the Pennsylvania road. During the preparation of the Rules on Train Dispatching, formulated by the eminent Managers and Superintendents composing the Time Convention Committee, Mr. Anderson acted with that committee, and his suggestions in "The Train Wire," with his other work in that line, were largely used as the basis for this portion of the Time Convention rules. . . . The duplicate form of order is presented by Mr. Anderson as a vital feature in the science of dispatching. When he first wrote this form of order was in use on few roads. Many officers were ignorant of it, and most others knew of it only in a vague way or looked upon it with disfavor as impracticable for roads doing a heavy business. Now, the requirement that all trains concerned in the execution of a specific movement should receive the order in the same words, is widely recognized as an axiom, and rules based on this principle are fast coming into general use. The first part of the book treats of general principles, while the latter part takes up the rules which embody those principles and give them effect, the Standard Code being taken as the basis of the discussion. . . . These comments serve to point out to those not thoroughly acquainted with the subject the relations of the rules to the reasons for them, and this must be useful to beginners in the science and to men on new roads. For officers of experience, whose positions remove them from personal contact with the telegraph work and yet require that they have particular knowledge of it, a book of this kind should be both elementary and full; and all readers will find in examining the rules for practice that there is an advantage in having attention directed to the conformity of the rules with the principles before enunciated. Mr. Anderson's scheme for numbering switches and using those numbers in train orders, to facilitate the movement of trains at meeting points, is described in the book. This plan has been put in use to some extent and has given great satisfaction; and in connection with "lap-sidings" it has been found of marked benefit in handling a heavy traffic on a single-track road.

"In this revision the superintendents and dispatchers, the operators young and old, among the million rail oaders of the United States, have a better handbook than ever before, while the author can justly take pride in the fact that the individual views expressed by him in 1883 are now generally accepted truth. The introduction of the Standard Code on 70,000 miles of American railroads is one of the important steps in recent years in railroad operation, resulting in greater security to life and property; and 'The Train Wire' should be credited with a liberal share of the honor of the reform."

Retaining Walls for Earth, including the Theory of Earth Pressure as developed from the Ellipse of Stress. By Malverd A. Howe, C. E., Professor of Civil Engineering, Rose Polytechnic Institute. Second edition, revised and enlarged. New York: John Wiley & Sons; 1891. Pages 136, 12mo. Price, $1.25.

In criticising any work of scientific bearing one may take two altogether different views of it. One from the standpoint of the practical engineer, who wishes to have at hand works of reference to which he can turn for solutions, and thus save clogging his memory with what he may only occasionally need, and which shall be as free as possible from theories and demonstrations that he has studied in "The Institute," and which he has little time or inclination to prove anew.

The other standpoint is that of the professor, who, not being in practice, looks for new and better demonstrations of old theories, or for the correctness of the demonstrations of new theories. The engineer at the present time has good reason to complain of the society of books that he can use as tools. There is no scarcity of books whose octavo or quarto ponderosity bears witness to the elaborateness of the demonstrations within.

Prof. Howe's book is certainly cleverly planned for convenience of reference. The list of symbols at the beginning saves us what, in Prof. Rankine's works, is a great annoyance, that is, the difficulty of finding the meaning of a letter or symbol, especially one not often used. The graphical methods described are easily applied, and are general, except perhaps where the earth backing is of more than one kind of material, in which case a general solution would be impossible. Giving tables of values of constants is a good idea, as otherwise they must be calculated for each case, while with the tables they may be approximated with sufficient accuracy, by interpolation. The table of natural functions is always convenient. As a purely practical work, it would have been better to have omitted all general theory, which, though it is the author's authority for his assertions and formulas, is very much in the way when a book is to be carried for reference when traveling, or in the field.

American Practice in Block Signaling. With Descriptions and Drawings of the Different Systems in use on Railroads in the United States. New York: The *Railroad Gazette*, 1891. Price, $2.

This volume is made up of articles which have appeared in the *Railroad Gazette* within the last three years, with some revision. The illustrations, of which there are many, have been mostly re-engraved. The volume contains a concise account of the various systems of block signals in use on American railroads, including the simple block system, the Sykes, the Union, the Electro-Pneumatic, the Hall and Black's, with a chapter on single track blocking. Five-sevenths of the volume is made up of illustrated descriptions of apparatus and installations.

The book is a small one, having but 72 pages, but it covers the ground pretty thoroughly, and is in fact the only work on the subject which gives any account of American practice. The man who makes himself thoroughly familiar with the contents of this volume will have a very good start indeed toward a complete knowledge of the subject, and will be ready to keep pace with the rapid advance which block signaling is sure to make in this country in the next ten years.

Transactions of the Technical Society of the Pacific Coast. Otto von Geldern, Secretary, 1513 Vallejo street, San Francisco, Cal.

The issue of these *Transactions* for January and June, 1891, contains the following papers: "Street Paving in San Francisco," by S. H. Smith; "Hall's Hydro-Steam Elevator," by R. Hinchliffe; "Abrasive Processes in the Fine Arts" and "The Poole System of Grinding Calender Roils," by John Richards; "The Nicaragua Canal," by C. H. Taylor, U. S. N.; "Physical and Geological Traces of Permanent Cyclone Belts," by Marsden Manson. There are also minutes of regular meetings and other official matter. The papers which will have the greatest interest probably are the two by Mr. Richards, which belong together and form really one paper of 32 pages. This is a hurried review of various abrasive or grinding processes from the wet grindstone to the sand blast, and includes the wonderful results obtained in grinding calender rolls 7 ft. long true to $\frac{1}{5000}$ in. A brief account is given also of the method of rolling abrasion by means of chilled cast iron globules.

Journal of the Association of Engineering Societies, July, 1891. J. W. Weston, secretary, 78 La Salle street, Chicago, Ill. 30 cents.

The July issue contains: "Our Viaducts Across the Railroad Tracks," by Carl Gayler; "The Education of the Mechanical Engineer," by C. H. Benjamin; "Diagram for Approximate Sewer Calculations," by Edgar S. Dorr; "New Survey of Massachusetts: Topographical Survey by U. S. Geological Survey, 1884 to 1890," by E. W. F. Natter; "Plane-Table Methods Used in Western Massachusetts, 1886," by L. F. Cutter; "Town Boundary Survey," by C. H. Van Orden, and the Index to Current Literature.

TRADE CATALOGUES.

Hydraulic Working and Interlocking of Railway Points and Signals. A supplement to the Fourth Edition of Railway Safety Appliances. Published by Saxby & Farmer, Canterbury Road, Kilburn, London.

This supplement is issued for the purpose of showing and describing the hydraulic interlocking system of Bianchi & Servattaz, which received the gold medal at the Paris Exposition of 1889. In our issue of Aug. 2, 1889, this apparatus was described briefly. Messrs. Saxby & Farmer now say that after the most careful consideration and practical tests of this system in its perfected form, they are able to give it their unqualified approval, and they recommend it and are prepared to build it for many special places.

One objection to the apparatus which has formerly existed, viz., that the switch-points might not always be moved completely home, and the signalman be left in ignorance of the fact, is now said to have been absolutely removed by a return pipe which provides for a return pressure from the points to the point lever in the cabin and constitutes an infallible detector. This detail is illustrated and described in the pamphlet.

The apparatus may be worked with a hand pump or by power, according to the needs of the installation. It consists of a pump and an accumulator, with interlocked levers, in the signal cabin. Connection is made to the movements by which the signals or switches are thrown by pipes containing a mixture of glycerine and water. Or signals may be worked by ordinary wire connections, wires being connected to cylinders fixed in or near the cabin. In such instances compensators are not required, the stroke of the hydraulic piston being sufficient to take up the slack of the wire. No detectors are required for the points, for the reason above given. One lever unlocks, moves and locks again the points, and works the locking bar. The final movement of the locking bar sends the return pressure back to the cabin, allowing the lever in the cabin to complete its stroke.

One great advantage of this system is the compactness of the mechanism in the cabin. A 10-lever frame is 2 ft. 6 in. long by 1 ft. wide by 3 ft. 6 in. high, and may be used in any cabin large enough for a signalman to work in. Messrs. Saxby & Farmer recommend this apparatus particularly for Indian railroads, especially at passing stations on single lines, where the levers may be placed in the station master's office, who can work them independently of any outside help. Of course in such a climate as that of India the danger of freezing would entirely be eliminated.

The pamphlet is dated June 1, 1891, and it reports as in successful operation the following hydraulic plants: Mediterranean Railroad, Italy, 409 levers at various stations; one plant at Rome station has a 75 lever frame. On the Paris & Orleans Railroad 22 levers. On the Paris, Lyons & Mediterranean, 15. On the Southern of Italy, 192 levers.

TECHNICAL.

The Air Brake and the St. Mande Accident.

A letter from Paris to the *Courrier des Etats-Unis* gives the following particulars of one feature of the judicial inquiry into the responsibility for this dreadful accident. Experiments have been made to verify the statements of Engineer Caron, who claims that the Westinghouse brake on his train only acted on the first four cars. He says that the flexible rubber hose connection between the fourth and fifth carriages had been cut or was broken from deterioration. On the other hand he is blamed for not having applied the brakes the instant that he saw the tail lights of train No. 116, which was standing at St. Mandé station, at which instapt about 115 metres separated the two trains. The experimental train was started from Vincennes station and run up to a speed of 40 kilometres an hour. At the point where the engineman could have seen the tail lights of the train standing at the St. Mandé station the air brakes were applied and the train traveled a little less than 40 metres before being completely stopped. This, it will be seen, leaves 75 metres still between the two trains. After this first experiment the train returned to the Vincennes station. The cock in the train pipe was then closed between the fourth and fifth cars, and the train was again sent forward at the speed which was probably attained by the colliding train at the time of the accident. The brakes were again applied at the same point as in the first experiment, and the experimental train was stopped in 100 metres, leaving still 15 metres between the head of its engine and the tail of a train which might have been standing at the St. Mandé station in the position occupied by the wrecked train. A further experiment was made with this same train, consisting of 23 loaded cars, in which an emergency stop was made from a very high speed. The suddenness with which this stop was made seems to have satisfied the officials who are making the inquiry of the capacity of the Westinghouse brake.

The Hydraulic Laboratory of the Massachusetts Institute of Technology.

In our issue of July 24, p. 518, appeared a review of a pamphlet describing the engineering building of the Massachusetts Institute of Technology. In that review we said that the equipment of the hydraulic laboratory "is as yet quite limited." In fact the pamphlet was prepared from a meeting of the Society of Art held over a year ago, and since that time much has been done. The laboratory has a steel tank 5 ft. diameter, 27 ft. high; a stand-pipe 10 in. diameter, 90 ft. high; several pumps, and pipe connections of some magnitude—a soil pipe for experimental purposes, reaching to the top of the building; also apparatus for measuring flow through orifices, over weirs and in pipes and through mouth-pieces; for measuring velocity at different points in a jet; for determining the form of the jet in cross-section, together with several current motors, and, of course, mercury gauges and all the accessory apparatus.

Probably no other school in the world has such a laboratory as this. It has, in fact, facilities for carrying on any hydraulic experiments which can be conducted indoors.

Rapid Transit in Boston.

Mr. Osborn Howes, Jr., of Boston, is about to sail for England to look into the matter of city transit in London and other English cities. He will probably also visit Berlin for the same purpose. The object of his visit is not so much to study the methods of constructing the City & South London tunnel, and other foreign city railroad structures, as to examine into the business that they do and their methods of doing it, to ascertain how far those methods are adapted to the needs of Boston.

The Westinghouse Brake in Germany.

The Pittsburgh *Chronicle-Telegraph* says that a cablegram received from the agent of the Westinghouse Brake Co. announces that the Prussian state railroads have decided to adopt the Westinghouse quick action brakes to replace the Carpenter brakes, which have heretofore been used. This decision gives the Westinghouse company the entire brake business of the German empire, the brake having previously been adopted by a number of the railroads controlled by the different states.

The Master Mechanics' Association Scholarships.

The scholarships which this association has secured in the Stevens Institute of Technology, Hoboken, N. J., will begin this year, and candidates are required to be in attendance for examination on the week beginning Sept. 23. Candidates must be the sons of members or of honorary members of this Association in good standing, or the sons of deceased members who died in good standing. They must also have worked for at least one year in a recognized machine shop, and they are required to take the course of mechanical engineering. There are four scholarships open this year, one for four years, one for three years, one for two years and one for one year's course. The candidates for the four years' course will be required to pass the Freshman examination; those for the shorter terms will be required to pass the examination of the scholars belonging to the respective years. If there is more than one candidate for each scholarship, the applicant who passes the highest examination will be chosen. This will be settled by the school authorities

Heilmann's Electric Railroad.

Mr. Heilmann's system is to place a steam engine and dynamo in a vehicle which takes the place of the present locomotive. Current is carried by conductors, which pass under the carriages to a series of electric motors, which drive some or all of the axles. The adhesion can thus be increased as much as may be desired, and the steepest gradients ascended. A triple expansion engine is to be used, and in order to assure equal work being done by all the motors, their armature coils are all in series with one another, and current is supplied from one dynamo; the field magnets of the motors and of the generating dynamo are excited by current from a dynamo working at constant potential. The boiler is capable of developing 600 H. P., and is of the type in common use on torpedo boats. The steam engine is coupled direct to the dynamo, which is a Rechniewski multipolar machine. A switchboard is placed in front of the vehicle, and openings are left through which the driver can look out. It is hoped that a speed of 50 miles on grades of 1 in 200 will be reached, and 75 to 80 miles on the level. The motors are also of the Rechniewski type placed direct on the axles, and the cables are joined by couplings between the carriages. The directors of the state railroads in France have placed rolling stock at the disposal of the inventor, and have given permission for the experiments to be made upon their lines.

Car Heating.

The Maine Railroad Commissioners have approved the following heaters on various roads: The Edwards, Baker, Sewall, Kimball, Gold, Johnson, and Spear.

A Cunard Record Breaker.

It is stated that the Cunard Company has contracted for a transatlantic steamer with which it hopes to capture the record for fast voyages. The new vessel will be 600 ft long and upward of 12,000 tons burden, and will have twin screws. It is expected that she will come up to 22 knots at sea.

THE SCRAP HEAP.

Scrap Notes.

The freight brakemen and conductors of the Lake Erie & Western struck last Monday on the line between Muncie and Sandusky. The question is one of pay for overtime. All freight trains have been sidetracked and none were running on Tuesday.

The Missouri Pacific Railroad has issued orders to all conductors to take up scalpers' tickets, and to keep a sharp lookout for them.

The Louisville & Nashville has recently attempted to put colored brakemen on some of its trains. The local assembly of the Brotherhood of Railway Trainmen protested, but to no purpose. The white men have, however, made matters so uncomfortable for the negroes that they will probably not be able to retain the place.

It is rumored that the ticket collectors will be taken off from the Big Four.

A press dispatch states that A. B. Stickney, of St. Paul, has disposed of 650 acres of land in Chicago to 20 packers of that city, not including Armour, Swift and Morris, and that they propose to immediately open stock yards on the new location.

The Separate Car Law.

There is no reason why the negroes in this portion of the state should kick because of the separate coach law. Last Sunday afternoon the westbound train on the Sunset road had one of its cars labeled "For Negroes," and the others "For Whites." In the white man's cars there was a mixed crowd of Caucasians, Mexicans and Chinamen, all in a common state of perspiration. All who could get to windows eagerly thrust their heads out to catch a breath of Hondo ozone, which we have been advertising, and which, by the way, is now being served in an overdone state. In the forward coach sat a solitary Senegambian, as proud as a Tyler receiver in his private car, his dignity as stiff as his immaculate standing collar. —*Hondo* (Tex.) *Herald.*

New Stations and Shops.

Mr. M. J. Becker, Chief Engineer of the Pennsylvania lines, wrote last week to the Mayor of St. Louis to obtain a franchise from that city to erect, on a block bounded by Main, O'Fallon, Second streets and Cass avenues, a freighthouse to be 705 ft. in length and 60 ft. in width, one story high and with a two-story gable.

The New York Central & Hudson River has nearly completed the rebuilding of the shops at West Albany, N. Y., which were burned last May. The walls are up and the roof only remains to be completed. The roof is to be of iron and is being constructed by the Hilton Bridge Co. It is stated that most of the repair work on the entire section will hereafter be done at West Albany. A large amount of new machinery and tools is to be purchased for the shops.

The Central Railroad of New Jersey has prepared plans for a new station at Bayonne, N. J. The building will be of stone, 73 ft. long, and surrounded by an overhanging roof. The roof will be highly ornamental, and will increase the length over all to 94 ft. The width will be 35 ft. The interior will be finished in hardwood, and will contain antique fire-places in each apartment.

The Philadelphia, Wilmington & Baltimore has located the site for a new passenger station at Havre de Grace. The new building will be 62 × 28 ft., two stories.

When is a Car Imported?

The Treasury Department has given an opinion to the following question: "If a United States company builds cars in the United States and leases them to a Canadian railroad, to be operated on business in both countries and in which each company realizes a portion of the earnings, should duty be charged on said cars?" The decision is that if the inquiry relates to the daily or weekly passing of cars across the Canadian frontier, engaged in regular traffic between the two countries, they cannot be considered as importations, subject to duty.

For Coast Defense.

A government official is examining the channels and inlets between Cape May and Atlantic City as part of a plan for establishing a line of inside channels 8 ft. in depth, for torpedo boats and other light craft engaged in coast defense. Vessels will enter the Raritan Canal at Raritan Bay, pass into the Delaware River below Trenton, thence by the Delaware & Chesapeake Canal into Chesapeake Bay. A similar line of inside channels will be laid out on the coast of the Carolinas.

Samson Bell Cord.

A small boy of our acquaintance, after looking attentively at the trade-mark of the Samson Cordage Works, which represents Samson in his great lion act, said: "Well, papa, it wasn't a very strong lion, was it?" The child has a talent for skepticism which worries his dad. Whatever railroad men may think of that old story, we suppose that they are not skeptical about the advantages claimed for the Samson bell cord in a circular recently sent out with samples of the cord. The makers say: "The 'Samson' label is placed only on cord of the best material, braid and finish, and though there are other brands that can be sold at a trifle less, the difference in wear is much more than the difference in price. If you insist on using only the 'Samson' cord you will have to come to us less often, but you will flatter our pride, though you reduce our profit."

The Rev. Talmage Does His Part.

General Passenger Agent Lee is in receipt of a letter from Rev. T. De Witt Talmage, who traveled via the Colorado Midland in his recent lecturing tour through the West. We quote some of the gems:

"The 'Colorado Midland' (Pike's Peak route) is an enchantment from the first spike of the rail to the last switch. The engineering that made possible such a road eclipses everything I have seen. In places the red rocks are left in shapes which suggest deserted cities, Alhambras, obelisks, coliseums and Egyptian pyramids. The whole region shows what the Almighty can do with rocks." And this shows what a G. P. A. can do with a pass.

Electric Lighting of Railroad Trains.

On some lines in Germany candles and oil lamps are still in use, but during the last 12 years Pintsch's oil gas has been largely introduced on main line trains. Although this method of illumination is a distinct advance over the older illuminants, it is not quite satisfactory. The light is unsteady, especially in stormy weather; there is frequently an unpleasant smell due to leakage, and there is also a serious element of danger, as is shown by the terrible accident at Wannsee in 1880, at which several persons were burned to death by the escaping gas. In all these respects electric lighting is better, though it may be more costly. In the Khotinsky system of electric lighting each coach is provided with two distinct storage batteries, and the lamps are on two distinct circuits, so that in case of accident to one circuit, or during the changing of the batteries, no compartment shall be left entirely without light. The storage cells, which have been specially constructed to stand rough handling and vibrations, have a capacity of 200 ampère hours at 16 volts and 7 ampères. Each battery supplies current to four 8-C. P. lamps for the compartments and one 5-C. P. lamp for the lavatory. The weight of a battery is six cwt. The batteries are placed in boxes, one at each end of a coach under the floor, and special arrangements are made for rapidly replacing the exhausted batteries by others newly charged. The wiring is on the outside of the coach, and one lamp in each compartment is provided with a switch and the other with a resistance by which its light may be reduced to 2 C. P. at the pleasure of the passengers. This light is in use on the line, Fulda-Frankfort, and is being fitted on one of the express trains running between Berlin and Frankfort.—*Inst. C. E., Abstracts of Papers.*

New Grain Elevators at Baltimore.

The two new grain elevators of the Northern Central near Baltimore will be used for the first time this week. The one situated south of Madison street, east of Jones' Falls and just beyond Calvert Station, elevator No. 2, has a capacity of 300,000 bushels, and is intended for the handling of oats, corn and other grains for city delivery. The company will operate this elevator itself. The other elevator, which is at Canton, is known as No. 3, and will be conducted under lease by the Baltimore Elevator Co. in connection with Canton elevator No. 1, the capacity of which is 500,000 bushels. The new elevator has a capacity of 1,000,000 bushels, and is intended for export grain.

Compensation for the Moenchenstein Accident.

Relative to the question of damages to be paid in the Moenchenstein railroad bridge accident, the Austrian *Eisenbahn Zeitung* says that a number of years ago the five principal railroads of Switzerland made an agreement according to which the company on whose road an accident occurred is obliged in the first place to effect a settlement with its own injured employés and to provide a sum of 15,000 francs to the damage fund for the injured passengers. Should the damage claims exceed 15,000 francs, the company is to contribute an additional sum, amounting to five per cent. of the excess over the above figure, the remainder being made up by assessment of all the companies in the combination, in proportion to the receipts from passenger traffic and their yearly mileages. In the case of the Moenchenstein accident, therefore, the Jura-Simplon road will have to bear the loss from destroyed property, the expense of reimbursing its employés for damages sustained, the contribution of 15,000 francs to the accident claims of the passengers, 5 per cent. of the excess of these claims above 15,000 francs, and finally, a portion of the remaining 95 per cent. of this excess. Of this 95 per cent. the Jura-Simplon road will have to bear 31 per cent.; the Northeastern road, 25½ per cent.; the Central road, 17½ per cent.; the St. Gotthard road, 15 per cent., and the United Railroads of Switzerland, 11 per cent. The loss of the Jura-Simplon road is covered by insurance to the extent of four-fifths of the 15,000 francs, for the 5 per cent. of the excess of the damage claims above the 15,000 francs, and for its portion of the remaining 95 per cent. Still the actual loss of the company for which there will be insurance money forthcoming is said to be very heavy.

A Lack of Evidence.

In the course of a hearing about the obstruction to navigation caused by the Canal Street Bridge over the South Branch of the Chicago River, the advocate for the bridge interest, who was named Rohrback, said in the course of his argument: "God Almighty never intended boats 300 ft. long to go up the South Branch." He was interrupted by Colonel Ludlow, who said: "Pardon me, but I must call your attention to the fact that you have introduced no evidence on that point."

LOCOMOTIVE BUILDING.

The Baltimore & Ohio has received three new passenger engines from the Baldwin Locomotive Works, to be used on the Philadelphia Division.

The Southern Pacific has ordered from the Schenectady Locomotive Works four compound engines with 19 × 24 × 27 cylinders. These engines are to be run on the division from Sacramento to Summit.

CAR BUILDING.

At the Wagner shops at East Buffalo have been built two handsome day cars for the Adirondack & St. Lawrence road. The exterior of the cars is of mahogany, finished in the natural color, and they have Wagner vestibules.

The Baltimore & Ohio has placed a contract with the Pullman Car Co. for 21 passenger cars to be used on the route between Baltimore and Cincinnati, and to be similar to those of the Royal Blue Line.

BRIDGE BUILDING.

Auglaize County, O.—The Smith Bridge Co., of Toledo, has been awarded the contract for three new iron bridges in this county. The company was the lowest bidder for an iron swing bridge at Minster, but was underbid by one company on the other two smaller bridges, although the contract for the three structures was awarded to the firm.

Athens, Ga.—The steel bridge across the Oconee River on the Georgia, Carolina & Northern, near Athens, has been completed. The total length of the bridge is 800 ft. and it has cost about $100,000.

Athens, N. Y.—The work on the new Lehigh Valley bridge at Athens is nearly completed, and it is expected that trains will run over it by the latter part of August.

Cecil County, Md.—The Youngstown Bridge Co. was the lowest bidder among nine companies for the building of two iron bridges in this county, one at McKinsie's Mills and the other at Brewster's Mill. The two bridges are to be erected for $3,320.

Centreton, N. J.—The Salem County freeholders have appropriated the sum of $20,000 for the building of a new drawbridge at Centreton.

Greenville, Miss.—The County Clerk will receive bids until Sept. 7 for building a pile or bent bridge across Six Mile Bayou; one across Atchafalaya Bayou, iron or pile bridge, and for two on road No. Nine.

Houston, Tex.—The new steel bridge built by the International & Great Northern across Buffalo Bayou, east of Houston, has been completed, and trains will be run over it this week. Another smaller steel bridge has just been completed by the road over the Trinity River at Riverside, Tex.

Marble Falls, Tex.—A contract for the iron superstructure of a bridge 670 ft. long, with a 16-ft. roadway, to be built over Colorado River, has been let to Messrs. Burns & Dillon, San Antonio, Tex., for $28,000.

Merced, Cal.—The Board of Supervisors have let a contract for a wagon bridge across the Merced River at Merced Falls to McKinnon & Tammelty, of Stockton, and A. J. Meaney, of Merced, for $888. The bridge is to be finished by Nov. 1, and will be a Howe truss of two spans.

Mill City, Or.—The county court at Salem, Or., has ordered a survey made for a new bridge across the Santiam River at Mill City. The bridge will probably be built jointly with Linn County.

Millington, N. J.—The Riverside Bridge Co. has the contract for the iron work of the new bridge to be built across the Passaic River at Millington. The contract price is $1,650. Thomas J. Allen, of Morristown, N. J., has been awarded the contract for the mason work at $5.50 a cu. yd.

Morgantown, N. C.—The County Commissioners will soon advertise for bids for the construction of an iron bridge across the Catawba River; bids to be made on a single span of 200 ft. and on two spans of 100 ft. each.

Napa, Cal.—The city trustees adopted plans for a steel bridge across Napa River at Third street on Aug. 8. The plans provide for a structure to cost about $27,000, and an election will be held Sept. 10 to vote for the bonds which will have to be issued to meet the expense of the structure.

Oshkosh, Wis.—A petition has been made to the aldermen for a new bridge across the Fox River.

Pittsburgh, Pa.—Work has begun on the new suspension bridge over the Allegheny River at Sixth street. The piles are now being driven, and the masonry of the only pier, which is to be in the center of the stream, has been started. The abutment at the Pittsburgh end will be commenced in about two weeks.

St. Paul, Minn.—The bridge which the Chicago, St. Paul, Minneapolis & Omaha road proposed to build over the railroad tracks on Payne avenue in St. Paul has been postponed on account of the refusal to lower the grade of the avenue, the property owners insisting that the railroad tracks should be raised 2 ft.

Scranton, Pa.—The Select Council has rejected all bids for the superstructure of Market street bridge, as they were higher than the City Engineer's estimate. The bids for the abutments were under the City Engineer's estimate of $4,500, and the bids were referred to committee with instructions to award the contract to the lowest bidder.

Spokane, Wash.—A steel cantilever bridge is being built over the Spokane River, at Spokane, Wash., by the Spokane Bridge Co., of Toledo, O. The bridge has a canal height of 1,135 ft., and consists of three cantilever spans, one 277 ft. 4 in., two 189 ft.; three steel truss spans, 105 ft., 90 ft. and 54 ft. long, respectively, and trestle approaches. The distance between centers of trusses is 30 ft., the roadway is 38 ft. 8 in., and there is an 8-ft. 8-in. sidewalk at each side. The roadway will carry double tracks for a street railroad, and will be floor beams bolted together in pairs, except underneath the street railroad rails, where single 7 × 16 in. beams will be used. The bridge will be supported on iron trestlework piers.

Utica, N. Y.—Dean & Westbrook have prepared plans for a highway bridge to be erected on the Masonic Home Grounds at Utica, across the Yahnunsaga Creek. The plans provide for a handsome iron structure 70 ft. long in the clear, with a driveway 18 ft. wide, on each side of which foot paths will be built 5 ft. wide.

West Superior, Wis.—A citizens' committee has been appointed by the Mayor to arrange for building a highway viaduct one-quarter mile long over the railroad tracks.

White River Junction, N. H.—The Boston & Maine is tearing down the old wooden bridge across the Connecticut River at this point and will build this season in its place on the present site a new iron structure.

Wilkesboro, N. C.—The Winston Land & Improvement Co., of Winston, has let the contract to Andrew Murdoch, of Salisbury, for building the abutments and other stonework of the bridge over the Yadkin River at North Wilkesboro.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

In New York the Supreme Court holds that the rule that unless a railroad company intends, in good faith, to do what it has proposed in its articles of association, the private owner shall not be compelled to sell, and the company shall not be permitted to take property for the public use, does not apply where the property has been taken and the railroad has been constructed and has been in operation for years, carrying a large number of passengers daily, though the road as built does not correspond with the original designation in its charter.[1]

The Supreme Court of Vermont decides that the tax law of the state, providing that, when a railroad is operated under a lease, the tax shall be paid by the lessee, and deducted from the rent, is not unconstitutional, as impairing the obligation of contracts.[2]

In Iowa the Supreme Court rule that a contract by a railroad company in settlement of a claim for personal injuries by an employé to give him permanent employment on a switch-engine is not void as against public policy in that it would require the company to employ that injured person, even though he was not competent, in violation of its obligation to the public, as the contract does not require the company to keep him at work when incapable.[3]

In Arkansas the Supreme Court rules that the question as to the justice of the regulation of passenger rates must be determined by its effect on the net earnings of the entire line operated by defendnnt company, and not by its effect on the net earnings of any given subdivision of the whole line, even though such subdivision was formerly a separate road, owned by a different corporation, which was consolidated with defendant.[4]

In the same state it is held that a foreign company operating a railroad in the state is subject to the laws regulating passenger rates, and that no railroad can claim exemption, because its right of way was granted by the government which declared it to be a post and military route and national highway for governmental service.[5]

Injuries to Passengers, Employes and Strangers.

In Arkansas the Supreme Court rules that the voluntary payment by a passenger of an unlawful overcharge does not preclude him from recovering the statutory penalty. Nor does the fact that he got upon the train for the sole purpose of subjecting the company to the penalty.[6]

In Texas the Supreme Court holds that where a railroad agent at the regular ticket office sells a ticket good only on a special train which is in charge of a third person, whose name is signed to the ticket, but of whose contract with the carrier the purchaser is ignorant, such sale constitutes a contract of transportation binding on the carrier.[7]

In Indiana a boy of 16 years was a passenger on defendant's train, and gave the conductor his ticket. The conductor afterwards demanded his fare again, and refused to believe the boy's assertion that he had given him a ticket; whereupon the boy gave the conductor 10 cents, which was all the money he had, but the conductor ordered him to leave the train at a station short of his destination, whereby he was compelled to walk the rest of the way. The Supreme Court holds that judgment for $195 was not excessive.[8]

In Tennessee the Supreme Court rules that where a brakeman, in violation of the rules of the company, undertakes to make a coupling to a moving train, and is injured, he cannot recover for the injury, and it is immaterial that he was ordered to make the coupling by the engineer of the train.[9]

In Iowa it is held by the Supreme Court that the fact that a brakeman who steps between a moving car and an engine in order to uncouple them, and slips on the ice on the track believes that this is not an imprudent thing to do, and has good ground, as a reasonably prudent man, for so believing, does not relieve him of contributory negligence.[10]

In Georgia the Supreme Court rules that an injury occurring to a brakeman while passing over a car loaded with ore, through a piece of ore turning under his foot, thereby precipitating him to the ground, is *prima facie* the result of accident rather than of the negligence of the railroad company.[11]

In North Carolina the Supreme Court holds that a railroad having cut its road-bed along the side of a mountain, it is negligence for it to leave masses of rock, which had been loosened in blasting, in such a position that they are liable to fall at any time upon the track; and it is not relieved from liability for a consequent injury to an employé on its train by the fact that it hires a track-walker, whose duty it is, before and after the passage of each train, to see whether rock has fallen, or is about to fall.[12]

In New York the plaintiff driving a Leary ice wagon along a street which crossed defendant's railroad at a point where trains on the railroad were not visible until the tracks were reached, did not stop before crossing the track, nor look to either side, as the construction of the wagon made it impossible without some effort to see otherwise than straight ahead. He did not see a train approaching on the further track until the horses were on or across that track and he was struck by the engine and injured. The Supreme Court holds that he was guilty of contributory negligence, and that the absence of a flagman from the crossing at the time, plaintiff having only sometimes seen one there, gave him no right to assume that the crossing was safe.[13]

In Indiana plaintiff, on approaching the crossing of defendant's railroad at the only point from which he could see an approaching train until close to the crossing, looked and listened, and not seeing or hearing any train, proceeded, with his team walking, continuing to look and listen until he was close to the crossing, when a train, without giving any of the signals required by law or other warning, came rapidly, frightening his horses. Plaintiff attempting to hold them was thrown down and injured by the horses and wagon passing over him. The Supreme Court holds that defendant was not exonerated from liability for failing to give signals of the approach of the train by the fact that plaintiff's horses were frightened by the lawful sounding of the whistle as a signal for the crossing of another highway as well as by the moving train, and because it did not appear that the horses were docile or that plaintiff could have heard the signals if sounded, and would have stopped and could have controlled his horses at that distance.[14]

[1] In re Metropolitan El. R. Co., 12 N. Y. S., 506.
[2] Vermont & C. R. Co. v. Vermont Cent. R. Co. (Vt.), 21 Atl. Ref., 262.
[3] Jessup v. C. & N. W. Ky. Co., 48 N. W. Ref., 77.
[4] St. L. & S. F. Ry. Co. v Gill., 15 S. W. Rep., 18.
[5] St. L. & S. F. R. Co. v Gill., 15 S. W. Rep., 18.
[6] St. L. & S. F. Ry. Co. v. Gill, 15 S. W. Rep., 18.
[7] Eddy v. Harris, 15 S. W. Rep., 107.
[8] I. G St. L. Ry. Co. v. Howerton (Ind.), 26 N. E., 792.
[9] E. T., V. & G. Ry. Co. v. Smith, 14 S. W. Rep., 1077.
[10] Pieart v. C. R. I. & P. Ry. Co., 47 N. W. Rep., 1017.
[11] E. T., V. & G. Ry. Co. v. Suddeth, 12 S. E. Rep., 682.
[12] Bean v. Western N. C. R. Co., 12 S. E Rep., 690.
[13] Whalen v. N. Y. Cent. & H. R. R. Co., 12 N. Y. S., 527.
[14] T. H. & I. R. Co. v. Brunker (Ind.), 26 N. E. 178.

MEETINGS AND ANNOUNCEMENTS.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Boston & Albany, annual, Boston, Mass., Sept. 23.
Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 16.
Chicago, St. Paul & Kansas City, annual, Dubuque, Ia., Sept. 3.
Connecticut River, annual, Springfield, Mass., Sept. 16.
Detroit & St. Clair River, special, St. Clair, Mich., Sept. 15.
Fitchburg, annual, Boston, Mass., Sept. 30.
Hutchinson & Southern, special, Hutchinson, Kan., Aug. 25.
Iowa Central, annual, Chicago, Ill., Sept. 4.
Lake Erie & Western, annual, Bloomington, Ill., Sept. 2.
Minneapolis, St. Paul & Sault Ste. Marie, annual, Minneapolis, Minn., Sept. 16.
Nashville, Chattanooga & St. Louis, annual, Nashville, Tenn., Sept. 9.
New York, Ontario & Western, annual, 18 Exchange Place, New York City, Sept. 30.
New York, Providence & Boston, annual, Providence, R. I., Sept. 9.
Ohio, Indiana & Western, annual, Indianapolis, Ind., Sept. 8.
Old Colony, annual, Boston, Mass., Sept. 29.
St. Johnsbury & Lake Champlain, annual, St. Johnsbury, Vt., Sept. 10.
Toledo & Ohio Central, annual, Toledo, O., Sept. 7.
Wabash, annual, St. Louis, Mo., Sept. 8.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *International Association of Ticket Agents* will hold its next annual meeting at St. Paul, Minn., Sept. 7.

The *Roadmasters' Association of America* will hold its next annual convention at the West Hotel, Minneapolis, Minn., Sept. 8, 9 and 10.

The *Master Car and Locomotive Painters' Association* will hold its twenty-second annual convention at the Arlington Hotel, Washington, D. C., Sept. 9, 10 and 11.

The *American Association of General Passenger and Ticket Agents* will hold its next annual convention at Old Point Comfort, Va., Sept. 15.

The *American Association of Railroad Clerks* will hold its second national convention at St. Louis, Mo., beginning Sept. 16.

The *International Brotherhood of Railway Conductors* will hold its third annual convention at Louisville, Ky., Sept. 21.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* will hold its next meeting at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in September.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union Station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street New York

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m, on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* hold regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursdays at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* hold regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of erch month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at iss rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers' of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N.Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis. Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 p. m. on the first Friday of each month.

Master Mechanics' Association.

President Mackenzie has appointed the following committees for conducting the business of the year 1891-92:

Exhaust Pipes, Nozzles and Steam Passages: C. F. Thomas, A. W. Gibbs, L. S. Randolph, J. M. Wallis, Geo. W. Smith, Robert Quayle, John Y. Smith.

The Present Status of the Car Coupler Question: John Hickey, G. W. Rhodes, Sanford Keeler, R. H. Blackall, M. N. Forney.

Standard Tests for Locomotives: To investigate the practicability of establishing a standard system of tests to demonstrate the fuel and water consumption of locomotives. Also to ascertain the value of the steam engine indicated in locomotive tests. J. N. Lauder, J. Davis Barnett, Albert Griggs, John D. Campbell, F. W. Dean.

Compound Locomotives: To investigate the relative economy of compound and simple locomotives; also the most valuable form of compound locomotive. George Gibbs, William H. Lewis, Pulaski Leeds, James Meehan, T. W. Gentry, A. T. Woods.

Auxiliary Committee: S. M. Vauclain, Baldwin Locomotive Works; Reuben Wells, Rogers Locomotive Works; H. N. Sprague, Porter Locomotive Works; A. J. Pitkin, Schenectady Locomotive Works; Joseph Lythgoe, Rhode Island Locomotive Works; F. J. Leigh, Canadian Locomotive Works; D. A. Wightman, Pittsburgh Locomotive Works.

Tests of Steel and Iron: To investigate the critical temperature of steel and iron. Also any other questions relating to steel and iron that the committee may consider of value. William Smith, J. N. Barr, A. W. Quackenbush, P. H. Peck, D. L. Barnes.

Uniform Locomotive Performance Sheets: To report on the practicability of establishing a system for recording the performance of locomotives that will fairly represent the work done. George F. Wilson, J. S. McCrum, John Player, James McNaughton, John A. Hill.

Standard Bolts and Nuts: To report on the best taper for bolts, and the proper size of nuts, rough and finished. Also to report on accurate measuring gauges. Wm. Swanston, Wm. Garstang, T. W. Gentry, W. Lavery, A. Dolbeer, L. R. Pomeroy.

Boilers for High Pressure Locomotives: J. M. Boon, H. D. Gordon, J. S. Graham, J. H. McConnell, W. H. Marshall.

Air Brake Standards and Inspection and Care of Air Brakes: R. C. Blackall, G. W. Stevens, David Clark.

Committee on Subjects for Investigation: J. Davis Barnett, George Gibbs, William Smith.

Southern Railroad & Steamship Association.

At a meeting of the Southern Railroad & Steamship Association in New York, the 13th, the agreement of last year was renewed. All the old board of officers were re-elected, as follows: Senator Joseph E. Brown, of Georgia, President; Thomas H. Carter, Commissioner; Charles A. Sindall, Secretary; John S. Creven, of Georgia, and E. K. Sibley, of New York, arbitrators. The executive board and rate committees will meet at White Sulphur Springs, Va., on the 28th inst.

Technical Society of the Pacific Coast.

At the last meeting of the Technical Society Hubert Vicher read a paper on the use of the figure 9 in arithmetical calculations as an aid to engineers in their computations, and President John Richards delivered an address on "Natural Standards," referring particularly to meter, pendulum and contact gauges in mechanical work. The following civil engineers were elected members: A. J. Brownle, of Portland, Or., Frederick T. Newberry and Emil Newman.

Western Society of Engineers.

This society will hold its annual summer meeting on Wednesday, September 2, with the following change in the original programme: By courtesy of Mr. Fish, President of the Illinois Central R. R. Co., member of the society, an excursion has been provided for by train to the World's Fair site at Jackson Park, Pullman, and over the Chicago, Madison & Northern R. R. entrance into the city of Chicago, which will occupy the entire day. Among the points of interest on the Chicago, Madison & Northern are the following: The latest practice in shallow steel floors for railroad structures; Interlocking Systems; a four-track, three-panel skew bridge; a balanced double-track draw-bridge, interlocked; the Illinois Steel Works; the most complicated grade crossings in the city of Chicago; works for the preservation of timber at Sixteenth street. In the evening the regular meeting of the society will be held, and at the close a collation will be provided.

PERSONAL.

—Mr. E. P. Black, General Live Stock Agent of the Denver & Rio Grande, has resigned. No successor has yet been appointed.

—Mr. B. S. Josselyn has resigned as Car Accountant of the Denver & Rio Grande, to take effect September 1, to engage in other business.

—Mr. John S. Gilbert, of New York, naval architect and inventor of the balance dry-dock, died at his country home, near West Point, N. Y., last Thursday, aged 90 years. Mr. Gilbert built the Erie Basin dry-dock at Brooklyn 40 years ago.

—General Joseph E. Brown, of Georgia, was re-elected President of the Southern Railway & Steamship Association at its recent annual meeting in New York City. He had resigned the office and it was believed could not be induced to accept a re-election He has held office continuously for a number of years.

ELECTIONS AND APPOINTMENTS.

Alliance (Oregon).—The incorporators are: Oscar E. Young, James H. T. Smith, W. F. Hickman, J. R. Wicks, H. Copley, J. J. Tompkins and W. H. Kincaid.

Brunswick, St. Marys & Florida.—The incorporators of this Georgia company and of the Cumberland Short Line are: John J. Spears, W. B. Burroughs, W. C. Burbage, W. F. Penniman, Joseph H. Clark, Louis J. Leavy, Robert R. Hopkins; Michaelis Kaiser, of Glenn County, Ga.; John A. Foster, of Camden County, Ga.; John L. Morgan, of Hamilton County, Florida, and William J. Cahoone, of New York.

Central of Georgia.—E. Ford has been appointed Roadmaster of the Southwestern Division of the road, with office at Macon, Ga.

Chicago & West Michigan.—T. C. Clark having resigned, the office of Claim Agent was abolished Aug. 15. The Legal Department has charge of all claims originating on the lines of the system. All reports and communications heretofore sent to T. C. Clark, Claim Agent, relating thereto, will be addressed to Wm. Alden Smith, General Attorney, Grand Rapids, Mich.

Columbia River & Astoria.—At a recent meeting of the incorporators in Astoria, Wash., the following officers were elected: President, J. H. Smith, Portland, Ore.; Vice-Presidents, W. C. Smith and E. A. Seeley; Secretary, C. H. Page; Treasurer, B. Van Dusen. Directors: B. Van Dusen, B. Young, E. A. Seeley, D. K. Warren and W. C. Smith. Mr. W. K. Kennedy, late of the Union Pacific, was elected Chief Engineer.

Des Moines, Northern & Western.—The following will be the officers of the consolidated company: F. B. Hubbell, President; L. M. Martin, General Manager; F. C. Hubbell, Vice-President and Superintendent.

Denver, Lakewood & Golden.—The following were named as directors in the amended articles of incorporation recently filed in Colorado: C. C. Welsh, President; John C. Hodges, W. F. R. Mills, W. A. Loveland and J. W. Starkweather.

Evansville & Terre Haute.—G. A. Smith has been appointed General Agent at Terre Haute, Ind., to succeed A. Campbell, who was recently promoted to be General Freight Agent.

Georgia, Tennessee & Alabama.—R. L. Spencer, A. J. McBride, J. H. Plummer, W. B. Thomas, L. F. Bellenger, J. R. Crandall and G. F. Quackenbush were elected as board of directors of the corporation at a recent meeting for organization at Edwardsville, Ala.

Grand Trunk.—The report of the resignation of J. Trenaman, Division Superintendent at Richmond, Que., and of the appointment of his successor, printed in this column last week, was erroneous. Mr. Trenaman still continues with the company, and has not changed his position.

Hunter's Run & Slate Belt.—The officers of this Pennsylvania road are: Jackson C. Fuller, President; John M. Butler, Secretary and Treasurer; A. C. Givler, Superintendent, and A. E. Lehman, Chief Engineer. The headquarters of the company are at Pine Grove Furnace, Pa.

Illinois Central.—C. A. Kniskern, Chief Clerk of the Passenger Department at Chicago, has been appointed Assistant General Passenger Agent, with headquarters at Chicago. He has been employed in the passenger department for a long number of years.

Lawrence State Line.—The following are the first board of directors of this Pennsylvania company: James M. Bailey, Pittsburgh, Pa., President; Geo. H. Kuhn and John G. Brighton, Pittsburgh, and Rawdon Evans, New Brighton, Pa.

Little Kanawha Valley.—The incorporators met at Parkersburg, W. Va., last week, and completed the organization by electing the following directors and officers: C. H. Shattuck, E. McCreary, W. A. McCosh, M. R. Lowther, V. B. Archer, J. H. Fischer, A. G. Jackson, M. Hardman, J. S. Withers. President, Charles H. Shattuck; Treasurer, William A. McCosh; Secretary, Edward McCreary, and General Counsel, V. B. Archer.

Lower Laurentian.—L. R. Lathrop, formerly Division Engineer of the Northern Pacific & Montana, at Helena, Mont., has been appointed Chief Engineer of this road, with office at Quebec, P. Que. James McNaught, Mills Building, New York City, is President, and W. A. Williams, also of New York, is Secretary and Treasurer.

Mexican Central.—A. H. Woods, the General Materia- Agent, has resigned, and James A. Snell has been appointed Acting Agent to succeed him.

Ohio Valley.—J. J. Logan, Traveling Freight Agent, has been appointed General Freight Agent, with office at Evansville, Ind., to succeed G. A. Smith, resigned.

Oregon Improvement Co.—It was announced some time ago that the general offices of the company would be moved from Portland, Or., to Seattle, Wash. A circular was issued Aug. 4 stating that the general offices, including the offices of the General Manager, Auditor and Cashier, had been removed to the Burke Building, Seattle.

Pittsburgh, Akron & Western.—W. S. Tayler has been appointed Acting General Freight and Passenger Agent, with office at Akron, O., to succeed D. W. Semple, resigned.

Richmond & Danville.—The official notice of the transfer of the general offices in the operating department of this company, as well as those of the Auditor and Treasurer, from Washington to Atlanta, Ga., on Aug. 22, was issued this week. Agents and conductors now make their reports and remittances to the Atlanta office, and connecting lines are requested to forward all reports for tickets, car mileage, freight, etc., to that address.

After Sept. 1 the office of the chief engineer of this company will be located at Atlanta, Ga.

St. Louis, Collinsville & Carondelet.—A. M. Powell is President of this road; M. M. Powell, of Collinsville, Ill., is Secretary and Treasurer, and S. A. Mitchell is Chief Engineer.

Southern Iowa.—The incorporators of this company are: Paul Morton, C. M. Schenck and Glen W. Treer, of Ottumwa, Ia. Paul Morton, Rookery Building, Chicago, is President, and T. C. Mauro, of Ottumwa, is Secretary.

Velasco Terminal.—At a recent meeting for organization held at Velasco, Tex., the following officers were elected: Hon. C. B. Farwell, Chicago, President; Gustav Wilke, Velasco, First Vice-President; Hon. E. I. Wilson, Brazoria, Second Vice-President; G. W. Angle, Velasco, Treasurer, and Lew L. Bryan, Velasco, Secretary.

Wisconsin Central.—James C. Pond, Assistant General Passenger Agent of the Northern Pacific, has been appointed General Passenger and Ticket Agent of the Wisconsin Central, vice Louis Eckstein, resigned to engage in other business.

Wheeling & Lake Erie.—F. H. Stark has been appointed General Car Foreman, with headquarters at Ironville, O.

RAILROAD CONSTRUCTION.

Incorporations, Surveys Etc.

Alliance (Oregon).—A company was chartered in Oregon under this name last week, the capital stock being $500,000. The railroad which it is proposed to build is to extend through the fertile wheat fields in eastern Washington, beginning near Pullman, on the Northern Pacific, and running in a general westerly direction through Whitman County to a point near the head of Penewawa Creek, thence down that creek to the Snake River near the mouth of the Penewawa Creek, a distance of 20 miles.

Arkansas Midland.—A local company is being organized at Helena and Trenton, Ark., to build a short branch of this road from the latter town south to Poplar Grove, in Phillips County. It is understood that the right of way has been secured and that the material has been purchased to complete five miles of track.

Black River.—The name of the Springfield road described in these columns last week has been changed to the above "on account of local feeling." As already stated, the line is now being located east of Cavendish, Vt., on the Central Vermont road. The surveying party is in charge of Major J. M. Fitch, of Perkinsville, Vt. The road when completed will extend west from Cavendish to Claremont, N. H., the western terminus of the Concord & Claremont road, a distance of 26 miles from Cavendish and on the east side of the Connecticut River. This will complete a nearly direct route between Concord and Rutland. At present the Central Vermont line runs south from Cavendish to Bellows Falls and the Concord & Claremont branch of the Boston & Maine has its terminus at the east side of the Connecticut River, south of White River Junction, near Claremont. The gap from Claremont to Cavendish is to be built by this new company.

Bristol Belt Line.—The first five miles of this line between Fairmount and Bristol, Tenn., is now in operation. The total length of the line will be nine miles, extending from North Bristol through Blounteville, Lakeside, Southwest Bristol and Fairmount. Some work has been done on the four miles not in operation, but no date has been set for completing the work. About half of the road lies in Tennessee and the rest in Virginia. The work is not very difficult, the grades are light and there is little curvature. The bridge work includes only a few small trestles. In addition to the capital stock of $100,000, bonds have been issued to the amount of $75.000 Nearly all of the bonds and stock have been subscribed in Bristol. W. A. Stadelman, of Bristol, Tenn., is Treasurer and Manager.

Brookfield.—The citizens of Brookfield, Mo., are engaged in securing subscriptions to the capital stock of a company which it is proposed to organize under this title to build a road from the Iowa state line south a distance of about 90 miles to Brookfield and Miami, Mo., to connect with the line surveyed by the Springfield, Sedalia, Marshall & Northern to the latter point north from Springfield.

Brunswick, St. Mary's & Florida.—Articles of incorporation were filed by this company in Georgia last week, the capital stock being $6,000,000. The road is to extend from Brunswick, south through Camden County, along the Atlantic coast via Blythe Island, to St. Mary's, where it will connect with a proposed road north from Harts Road, Fla., near the state line. The length of the proposed line is about 34 miles.

Calgary & Edmonton.—H. S. Holt, of Ross, Mann & Holt, the contractors for this road, states that about 2,000 men and 300 teams are now working on the southern extension from Edmonton in Alberta, on the Canadian Pacific, work having only been begun this month. The road, which will be completed before winter, extends south from Calgary to Fort McLeod, which is about 40 miles from the international boundary line, and about 40 miles east of Crow's Nest Pass.

Cambria & Clearfield.—Charles McFadden, of Philadelphia, is reported to have been awarded last week the contract for building about 17 miles of the road north of Carrollton, along Chest Creek, and including a large tunnel near the southern end. The contract has been previously let for the line from Kaylor to Carrollton, and work is now in progress on about three miles of this section.

Canadian Roads.—At a meeting of the City Council of Victoria, B. C., Aug. 17, it was decided to order a special election to submit by-laws appropriating nearly $3,000,000 for railroad subsidies. Of this amount $1,000,000 is apportioned to the Victoria & North American road, represented by Paul Schultz, which is said to be projected by the Northern Pacific. Another proposition is to connect with the Canadian Pacific at New Westminster, and with American roads at Blaine. The latter is the line of the Victoria, Saanich & New Westminster company, which asks for a loan of $500,000 for 25 years, and a subsidy of $20,000 annually for the same time.

Chesapeake & Ohio.—Reports were recently published in local papers and reprinted in some weekly journals, that extensions of the Craig Valley branch which has just been completed would be built from Newcastle, Va., up Johns Creek and Craigs Creek. All these reports of proposed extensions of the Craig Valley branch are erroneous. There is no prospect of any early extension of the line.

The branch from Covington north to Hot Springs, Va., a distance of about 25 miles, will be opened for operation before next month. The last track was laid last week.

Chicago & Alton.—Work has been begun on the second track between Pontiac and Chenoa, Ill., mentioned last week, about 50 men being now employed on the grading. All the work will be done by the company, and no part of it will be let out to contractors. The second track to be built this year between these points will be 10 miles long. The work will be light, and the grades of the new road will not exceed 24 ft. per mile, and the maximum curves will be one degree. The work includes the erection of one iron bridge, 150 ft. long.

Chicago & New Orleans.—A new survey for this line between the Ohio River, opposite Paducah, Ky., and Shelbyville, Ill., the terminus of the extension of the Chicago & Eastern Illinois, has just been completed by C. C. Moore, of Farina, Chief Engineer. It is stated that the grading will be commenced at Shelbyville, Ill., the northern terminus, within 60 days. The contract was let to F. M. Ferguson last May for the grading south of Farina, on the Illinois Central, to the Ohio River, 130 miles. The grading is now about completed through Marion south to Iuka, on the Ohio & Mississippi, a distance of about 15 miles. The contractors have 100 men on the work at Iuka at present.

Chicago, Rock Island & Pacific.—It is said that the road will build a short branch from its proposed elevated track in Chicago east to Jackson Park, over Sixty-first street, for at least a portion of its extent. It is stated that the project has been sanctioned by the board of directors, but that final action has not been postponed.

Columbus, Hocking Valley & Toledo.—A branch of this line to extend to Findlay, O., is proposed, and it is understood that the right of way is now being secured. The line will be about 10 miles long, extending in an easterly direction through Hancock County, O. The connection with the main line will probably be at Alvada, though this has not yet been determined. The entrance to Findlay will probably be secured over the tracks of the Findlay Belt line now under construction.

Cumberland Short Line.—This company was chartered in Georgia last week by the incorporators of the Brunswick, St. Mary's & Florida road. The line is to be about 12 miles long, and will extend from a point on the latter road near the Saltillo River, via High Point, Cabin Bluff, to Bunkley's, on the island off the coast of Camden County.

Delaware, Lackawanna & Western.—The short branch recently referred to as being built from near Drakesville is to extend to Hopatcong station, on the main line, about 46 miles from Hoboken, N. J., to the Forcite Powder Works. The branch will be about 1¼ miles in length when completed, and is to be built by the Forcite Powder Co., of No. 1 Broadway, New York City. The work is suspended on this branch at present.

Duluth & Winnipeg.—The contractors expect to begin tracklaying within the next 10 days on the extension from Cloquet, the eastern terminus at the St. Louis River, toward Duluth, to connect with the track of the Duluth Terminal road. Work is in progress on several branches on the western end of the line near Grand Rapids. The track was completed last week across Deer River near the crossing of Bass Brook, in Itaska County, about 10 miles from White Oak Point. The grading is nearly completed on the logging branch being built for the Itaska Lumber Co., north from the Mississippi River, near White Oak Point. Track on this line will be laid in a few days.

Findlay, Fort Wayne & Western.—The tracklaying is completed to Evansville, O., where a connection was made Aug. 12 with the Toledo, St. Louis & Kansas City, 13 miles west of the present terminus of the operated line at Ottawa, O. This completes 35 miles of the line west of Findlay. The road has been graded in the direction of Fort Wayne, Ind., as far west as the Indiana state line. The tracklaying west of Evansville will probably be suspended for some time, and it is not expected that the track will be laid on the balance of the graded road until next year. The maximum grade on the section just completed is 15.8 ft. per mile, and the maximum curves do not exceed 10 min. The stations on the new line are: Glandorf, 2.33 miles west of Ottawa; Brinkmans, 5.04 miles; Croswell, 7.86 miles; Dorninton, 8.85 miles; Cascade, 12.05 miles, and Evansville, 13.39 miles. C G. Patterson, of 10 Wall street, New York City, is the principal contractor. He is also the General Manager of the company.

Flint & Pere Marquette.—The short timber branch in northern Michigan, which it is proposed to build, will begin at Harrison, on the branch between Clare and Meredith Mich., and extend north and west through Clare County for a distance of 8½ miles. The company has not yet fully decided on the construction of the line, but the arrangements with the owners of the timber are practically completed and there is little doubt that the line will be built in a few months.

Georgia, Carolina & Northern.—The track will be laid at once on the 25 miles from Athens west to Lawrenceville, Ga., now that the bridge across the Oconee River at Athens has been completed. The tracklaying was completed to the east bank of the Oconee River about the middle of July, but the work west of the river has been delayed until the completion of the bridge. The road has been graded to Lawrenceville, and practically also to Atlanta, about 20 miles southwest of Lawrenceville. Land was purchased in Atlanta last week for the station in that city.

Georgia Roads.—Bills have been introduced in the Georgia Legislature to incorporate the following companies: the Hawkinsville, the Waycross Air Line, the Chalybeate Springs. Bills have become laws to amend the charters of the Cincinnati, Georgia & Florida, the Indian Springs road, the Atlanta & Alabama; and the Elberton & Washington; to incorporate the Atlanta Southern & Western, of which Frank Rice, F. E. Evans and Dr. Wilson are incorporators, the South Atlantic, the Alcovy & Northern.

Georgia, Tennessee & Illinois.—The report of organization was filed in the office of the Secretary of State

at Montgomery, Ala., last week. Books of subscription were opened in Stevenson, Fort Payne, Gadsden, Cedar Bluff, Piedmont and Edwardsville at dates from May 30 to June 3, and $250,000 was subscribed to the capital stock of the company. The road is projected by the Georgia-Alabama Investment Co., of Tallapoosa, Ga. Preliminary surveys have been made from that town through northeast Alabama to Stevenson, Ala., a distance of 125 miles.

Great Northern.—The St. Paul, Minneapolis & Manitoba having acquired the Wadena & Park Rapids road, extending from Eagle Bend to Park Rapids, Minn., 55 miles, the line will hereafter be operated by this company as part of its leased lines, and the jurisdiction of the several departments will extend to the new line in the same way as to the other lines operated by the company.

Great Northwest Central.—Mr. A. J. Charlebois, of Ottawa, the contractor for building this road, arrived this week from Europe, and confirms the previous report that he had completed arrangements for extending this road at once north of Oak River, Man., for at least 50 miles toward Battleford. Mr. Charlebois states that financial arrangements were made in Brussels which insure the early completion of this road, and also of the Montreal & Ottawa, of which he is also the contractor.

Greenbrier & Gauley.—Preliminary surveys have been made for about 25 miles of this road north of Alderson, W. Va., on the Chesapeake & Ohio, and seven miles has been located. The road as projected will be 45 miles long, extending from Alderson via Blue Sulphur Springs, Meadow Bluff and Ruperts, to Gauley, on the West Virginia & Pittsburgh. The road will run through rich coal and timber lands, about 10 miles of it being through the mountains. The company is now securing local aid and $38,000 has already been promised. Alexander McVeigh Miller, of Alderson, is President, and W. P. Smith is Chief Engineer.

Illinois Central.—Vice-President Harahan states that the cost of the improvements in the arrangements of the tracks for an entrance to the Columbian World's Fair grounds will aggregate $500,000. A "switching loop" will be built at Burnside, where the Chicago Belt line is intersected. Transfer lines will extend from Burnside north to Fordham, a point one and a half miles south of the fair grounds. From Fordham two extra tracks will extend as far north as Forty-third street, and these will be devoted exclusively to World's Fair traffic. The work will be completed within three months and 24 miles of track will be laid. Already between eight and ten miles are finished.

Kansas City, St. Joseph & Council Bluffs.—The surveying for the "cut-off" from Rushville, Mo., to Sugar Lake is completed, and the construction of the new line may be begun in September. The "cut-off" will make the distance between Rushville and Sugar Lake four miles shorter, and will take the road off the Missouri River bottoms, which are often overflowed. A track connecting Atchison with the main line at Sugar Lake will be built at once.

Knoxville, Montevale & Chilhowee.—An application for a charter has been filed by this company in Tennessee to build a road about 10 miles long from near Maryville south to Montevale, Blount County, connecting near that point with the Knoxville Southern, and to extend also to Chilhowee, about five miles further south. Among the incorporators are L. T. Hamilton, L. D. Dillon and J. L. Murphy.

Lackawanna & Montrose.—The construction of this line is further advanced than the article in last week's paper indicated. The grading is about completed from Montrose station, on the Delaware, Lackawana & Western, west to Montrose Borough, the county-seat of Montrose County, Pa. The track has been laid with the exception of about half a mile. The line is about 12 miles long and will probably be opened as soon as the ballasting has been completed. Smith & Henwood, of Montrose, Pa., are the contractors for the construction of the line.

Lawrence State Line.—This company was incorporated in Pennsylvania last week, the capital stock being $20,000. The road is to begin in the township of Mahoning, Lawrence County, Pa., on the Mahoning River, at the terminus of the Mahoning State Line road near the Ohio state line crossing, and extend in a southerly direction to limestone quarries, in the Township of Mahoning. The length of the road is to be about two miles. James M. Bailey, of Pittsburgh, is President.

Lenoir & Linville.—The track has been laid on three miles of this road, from Linville, N. C., instead of only half a mile, as stated last week. The road has been graded for about nine miles from Linville, which will probably be as far as it will be built for some time. The track is being laid on the balance of the graded roadbed, but not very rapidly, as only 40 men are employed at present. John N. Houck, of Lenoir, N. C., is Superintendent.

Mahoning & State Line.—This company is being organized at Youngstown, O., to build a short road in the eastern part of Mahoning County, O., along the Ohio River to lime stone quarries. The line will begin at Lowellville, and extend easterly from the Pittsburgh & Lake Erie to the Pennsylvania state line, and thence to Lawrence Junction. The line in Pennsylvania will be built under the charterof the Lawrence Junction road, of which James M. Bailey, of Pittsburgh, is President.

Mexican Northwestern.—The name of the Mexican North Pacific, a line projected from Deming, N. M., south to the Mexican line at Columbus and thence through northern Mexico to the Pacific Coast, at Topolobampo, has been changed to the above. This line was formerly known as the North Mexican Pacific, and before its purchase by J. W. Young, of Salt Lake City, it was called the Deming, Sierra Madre & Pacific, and in Mexico the Chihuahua, Sonora & Sinaloa. The grading on the line in New Mexico from Deming south is now about completed for nearly 35 miles, and it is expected that the work will soon be begun in Mexico and actively pushed.

Millen & Southern.—The company is making arrangements to begin the construction of the proposed extension south of Stillmore to Lyons, Ga., a distance of 20 miles. As yet, however, the date for beginning work is indefinite, and it may be found advisable to postpone work on the extension until after December. This year the company has laid 11 miles of track near Millen, on the new location of the main line, to the connection with the Central of Georgia. The main line now in operation is 32 miles long, extending from Millen southwest, via Garfield and Summit, to Stillmore.

Milwaukee, Lake Shore & Western.—The new line from Wausau to Marshfield, Wis. (generally known as the Marshfield Extension), is 40.6 miles in length, the general direction from Wausau being southwest, and the principal stations Marathon City and McMillan's. The track laying, as stated last week, will be finished inside of a month. The contractors for the work are Henry & Balch, of Minneapolis, Minn. There are 32 miles of track now laid (all laid this year), and 225 men are at work. The grading generally is light, the maximum grades are 40 ft. to the mile, and the maximum curves are four degrees. There are four steel spans crossing the Wisconsin River at Wausau, lengths 103 ft., 140 ft., 130 ft. and 145 ft. The bridge across the Big Eau Pleine River about 14 miles from Marshfield is 1,826 ft. long, and is all trestlework except one 126-ft. span (wooden).

Mississippi River & Bonne Terre.—The contractors expect to have the grading on the 16 miles of the extension between Bonne Terre and Doe Run, Mo., completed early in September. Two important bridges, one across Big River and the other across St. Francois, will be ready by the time the grading is completed, and trains will probably be run between Doe Run and Riverside before next January.

Montana Central.—Work has been recently recommenced on the branches from Monarch, Mont., and a force of about 60 men is now laying the track. The grading has been nearly done on both lines, from Monarch to Barker, 10.5 miles, and from Monarch to Neihart, 13.5 miles. Foley Bros. & Guthrie are the contractors for the grading. No track had been laid on either of the lines until the present month, but it is expected to have the two lines completed early in September.

New Orleans, Fort Jackson & Grand Isle.—The track on the extension of the main line along the west side of the Mississippi River will probably be laid to Buras, a few miles north of Fort Jackson, the southern terminus, in September. Buras is about 60 miles south of New Orleans, and the track has been laid and the line is in operation for 54 miles. About seven miles of road has been graded beyond the end of track, but the force at work on the extension at present does not exceed 120 men. About 14 miles of the track has been laid since January. The grading will be resumed in 20 days on the branch toward Grand Isle, which has been graded for the first few miles. The length of this line is uncertain, but it will be from 6 to 10 miles. The grading on the main line is very light, the work being practically level. The curves are five degrees. The only bridge on the line is a small iron draw, 48 ft. long, across the canal. All the funds for building and equipping the road have been obtained in Louisiana, mainly in New Orleans.

New Roads.—Surveys have recently been made and right of way secured for a road to extend from Madison, on the Macon & Northern, south a distance of about 20 miles, to Eatonton, on the Middle Georgia & Atlantic. J. H. Holland, of Madison, is a director.

A company is reported as being organized at Knoxville, Tenn., and chartered to build a road from a point on the Knoxville & Augusta road in Knox County to the Tennessee River.

The survey being made under the authority of the State of Alabama to examine the country in west Alabama through the coal fields, from Tuskaloosa and Florence through Mobile, which has been in progress since May, is nearing Mobile. The engineers are to secure data upon which to base estimates of the probable traffic of a road built on the route outlined. The survey has already been made from the Tennessee River, in Lauderdale County, through the counties of Lawrence, Winston, Walker and Tuskaloosa, and the party is now surveying the route in Hale. The line enters the county east of Carthage, and will pass near Havana, and thence to Greensboro.

E. J. Baldwin and others are organizing a local company to build a short branch of the Central Pacific between Truckee and Lake Tahoe, Cal. The line has been surveyed, and will be about 15 miles long. It is estimated that it could be built for $200,000.

Northern Pacific.—The extension from Missoula to Mullan and Wallace, Idaho, 120 miles long, has been opened for regular service its entire length. The line follows a direct route into the Cœur d'Alene country in Idaho, opening up new mining regions and an interesting and rich country. The opening of the line will be celebrated with an excursion from Wallace, Idaho, to Missoula.

The seven-mile branch of the Cœur d'Alene Railway & Navigation Co., between Wallace and Burke, Idaho, is now being changed from 3 ft. gauge to standard gauge.

Griggs & Heustis, of Tacoma, who are building the second track between Meeker Junction, near Tacoma, and Puyallup, Wash., about nine miles, have begun to lay the track. The grading is finished except for a short distance beyond the Puyallup Indian reservation, where curves are to be taken out. The new track will probably be in operation in three weeks.

Ohio Valley.—The company has just organized a party of engineers to make a preliminary survey for the proposed extension from Princeton southeast to Hopkinsville, Ky., on the Louisville & Nashville, a distance of about 30 miles. A reconnaissance of the route was made last year at the time when a company was organized to extend the line through Hopkinsville to Nashville, Tenn. Recently the town of Hopkinsville has voted $115,000 of township bonds for an extension of the road from Princeton and has also guaranteed a right of way.

Ohio & Virginia.—The company was incorporated in West Virginia Aug. 13. The road proposed is to extend from Point Pleasant to Hamlin, through Lincoln, Boone and Logan counties, to a point near Oceana, Wyoming County, thence to the state line, and by way of New Castle to Lynchburg, Va. The principal office is to be at Charleston. A. H. Hone, H. C. McWhorter, L. E. McWhorter, W. R. Estell and L. R. Hoffman, all of Charleston, W. Va., are the incorporators.

Philadelphia & Reading.—The people of New Hope, Pa., and other points along the Bucks County shore of the Delaware River, are again agitating the extension of the Northeast Pennsylvania road from New Hope, the present terminus, along the west shore of the Delaware River to Easton. The Reading had this route surveyed some months ago, and it is said the right of way has been secured a considerable distance.

Pittsburgh, Akron & Western.—A party of surveyors began work last week relocating a proposed extension of this road from Akron, O., east to Newcastle, a distance of about 10 miles. It is proposed to build the extension principally to secure new Eastern connections.

Pittsburgh, Shenango & Lake Erie.—The reports of a probable extension to Conneaut Harbor, on Lake Erie, are renewed, and it is stated the extension would be begun in September, if the right of way could be secured.

Portland Southern.—The company filed articles of incorporation in Oregon last week with a capital stock placed at $10,000,000. The company is to build a line from Portland, Or., to Astoria, through the counties of Clackamas, Washington, Columbia and Clatsop. The company is also to operate steamers on the Columbia and other rivers. The incorporators are: Frank Sperling, W. S. Mason, Moses Meyer, C. C. Clart and John L. Ayer, all of Portland.

Potomac Valley.—Work on the road is progressing rapidly. Mr. John B. McDonald, of Ryan & McDonald, the contractors, reports the grading as nearly completed, but a small portion in West Virginia still remaining unfinished. This road is an extension of the Western Maryland from Williamsport, Md., to Cherry Run, W. Va., a distance of about 14 miles. The line is intended to serve as a connecting link between the Western Maryland, the Baltimore & Ohio, and the Reading roads.

Richmond, Nicholasville, Irvine & Beattyville.—The extension of the line to Irvine, on the Kentucky River, a distance of 51 miles from Richmond, has been opened for traffic, the first regular passenger train having been run over the line Aug. 5. The extension is 23 miles long, from Nicholasville west to Waco, and then southeast along the Kentucky River to Irvine. The track on this section has been laid this year, the work having been resumed late in April. The road has been graded for about 20 miles beyond Irvine to Beattyville, but the track will hardly be laid until next year.

Rio Grande Southern.—The following account of the construction work on this road south of Ilium, Col., is supplementary to that published last week: The surveys have been completed to Durango, and construction is being pushed on the only unfinished work between Rico and the mouth of West Dolores River, 23 miles. The contracts are let for the grading, and the company is laying the track as fast as bridging will admit. The contractors for the grading are Carliles & Weitbrey, of Pueblo. The trains are running to Telluride, 45 miles, and a large force of men is at work on the track and bridges, and also on smoothing up the work completed last fall. The maximum grades on the work not yet finished are 1½ per cent., and the maximum curves are eight degrees. Three large bridges are now completed above Ames in the rock cliffs, and the large one crossing Howard's Fork of the San Miguel River is also erected.

St. Louis, Collinsville & Carondelet.—The right of way has been nearly secured for this road, which is to extend from Madison, Ill., via Collinsville and Belleville to East Carondelet, and having a mileage, including branches, of 50 miles. The survey has been finished and the company expects to soon close negotiations for building the line. S. A. Mitchell is Chief Engineer.

St. Louis, Kennett & Southern.—The work is soon to be resumed on the first section of this road from Malden, on the St. Louis Southwestern, south through Dunklin County to Kennett, a distance of about 23 miles. The rails will be laid between these points by the St. Louis Southwestern as soon as the bridges have been completed and the cross-ties laid. About $30,000 has been subscribed by the towns to complete this part of the road. It is proposed to extend the line southeast to the Mississippi River, opposite Memphis. The route will be through a rich lumber and cotton country. It is estimated that it will cost $1,000,000 to build the line to Memphis, and that the section in Missouri will cost $230,000 to construct. A company will soon be organized in Arkansas. H. N. Phillips, of Malden, is President.

Savannah, Americus & Montgomery.—In the article last week on the Montgomery extension of this road, it should have been said that the bridge over the Chattahoochee River west of Louvale has not yet been completed, and will probably delay the opening of the extension more seriously than any other work. The bridge is a very fine structure and is built of steel, and is being erected by the Edge Moor Bridge Works. It will probably be completed in September, when it is expected that the roadbed will be ballasted to Montgomery. The bridge consists of four iron spans, with a draw span, 227 ft. long, with rimbearing centre, and designed to be opened by hand. There is one through fixed span, 102½ ft. long C to C, end pins adjoining the draw span. Two deck plate girder spans, each 30 ft. long, one of each being placed at the end of the draw span and the fixed span. The structure is supported upon iron cylinder piers, and its total length is 1,440 ft.

Seattle & Montana.—The track on the line north to the connection with the Fairhaven & Southern at Jarman Prairie, is being laid rapidly, with occasional delays caused by lack of materials and the weather, but the work is now finished north of the Stillagaumish River for nearly 60 miles from Seattle. The connection with the Fairhaven & Southern has been completed. It was expected that trains would be running to Mount Vernon by Aug. 15.

Southern California.—The Highland Branch of this road, built under the name of the San Bernardino & Eastern, was completed last week, and regular train service commenced Aug. 17. The road is nine miles long, extending from near San Bernardino to East Highland, Cal., and will eventually be continued to Mentone and form a belt line around the San Bernardino Valley, the great citrus belt of Southern California. A portion of the track was laid previous to January, but has never been opened up for regular traffic. Three and one-half miles of the road required to complete this line have not yet been provided for, and it is somewhat uncertain when the work will be completed. There are no important bridges or heavy work on the branch. The road extends from San Bernardino to Anow Head, and then extends easterly through West Highlands, Asylum and Highland to East Highland. With the extension of the line to Mentone it will connect with the branch now in operation south of the San Bernardino River to Mentone. The new road begins at Highland Junction, the main line being used between that point and San Bernardino, 1 1/10 miles.

Southern Iowa.—The company has been incorporated in Iowa to build a road from Ottumwa west to the Des Moines River, a distance of about five miles. Paul Morton, Rookery Building, Chicago, is President, and T. C. Mauro, Ottumwa, Iowa, Secretary.

Southern Pacific.—Vice President Charles Crocker spoke as follows recently concerning intended improvements: "We are pushing the work on the road toward San Luis Obispo as rapidly as possible. We have commenced the alteration of the motor line in San Bernardino County to standard gauge. We shall build

into Lake County some day, but not until we find that it would be surely profitable. We have had surveys made, and are aware that another line is now raising subscriptions in the northern part of the county for an extension to Lakeport, but we are not assured, as yet, that the passenger traffic or the freight would pay. We have never been able to build a branch railroad out of the profits of the company, but we have been compelled to issue bonds for all of them."

The company is relaying 12 miles of track on the California Pacific Division, between Suisun and Sacramento, with 76-lb. rails, probably the heaviest in use west of the Missouri River.

South Fork.—This road has now been completed for eight miles east of South Fork Station, where it connects with the Pittsburgh Division of the Pennsylvania, and has been transferred to the latter road for operation. The route of the road is as follows: leaving the Pennsylvania road at South Fork Station, extending in a southeasterly direction through the famous South Fork Dam and Lake, following the South Fork of the Conemaugh River until it reaches the Junction of the Yellow Run, thence up the Yellow Run to the summit of the mountains. The maximum grades of the road are 200 ft. to the mile and the maximum curves 10½ degrees. George F. Huff is President and J. B. McIntyre Chief Engineer, both of Greensburg, Pa.

Stoneham.—A hearing will be given by the state railroad commissioners this week, on a petition of the Boston & Maine for permission to build a branch railroad from a point near Oak Grove station, Mass., on the Western Division, to a point on the Boston & Lowell branch in Stoneham. This is the proposed new road for the construction of which Stoneham has voted $50,000 of township bonds. Its length will be less than five miles.

Sumpter Valley.—The first few miles of this line from Baker City, Or., are now being operated as a logging road. It is expected to complete the 16 miles of the road west from Baker City, on the Union Pacific, to Sumpter, this year. The line has been graded for over 15 miles and partly graded for 10 miles additional.

Syracuse & Baldwinsville.—The purchase of this line by the Delaware, Lackawanna & Western seems to have been finally concluded. When the road was reorganized after the foreclosure sale last fall new four per cent. bonds were issued to the amount of $125,000 and preferred stock for $100,000. A majority of both of these issues is said to be now owned by the Lackawanna. The road is about seven miles long, and extends from Amboy, west of Syracuse, N. Y., north to Baldwinsville. A connection with the Delaware, Lackawanna & Western can be easily put in at the latter point.

Tintic Range.—The company filed amended articles of incorporation in Utah last week. The route of the road is described as being from Springville, Utah, on the Rio Grande Western, southwest to Goshen, thence across the Tintic Range via Homansville Pass to a point at or near Eureka and Mammoth Hollow, 65 miles. The capital stock is placed at $1,625,000, and of this $975,000 is common stock and $650,000 constitutes the preferred stock. The road, when completed, will probably be operated by the Rio Grande Western. Nearly all the stock is owned by interests friendly to the latter road, though the organization of the new company is distinct, and its relations with the older company are not so close that it can properly be called a branch of the Rio Grande Western, as it has heretofore been considered.

Toledo, Walhonding Valley & Ohio.—The contracts for building the road from Coshocton to Louisville, a distance of 46 miles, were awarded this week as follows: A. M. Winsper, Tiffin, O., 11 miles; W. F. Stanley, Reedy, W. Va., 16 miles; M. Spellacy, Cleveland, O., 11 miles; Jones & Winsper, Mt. Vernon, O., 4 miles; McCann & Elevinor, Steubenville, O., 4 miles. The above contracts are for grading and excavating, and were let out in small sections, so that the work can begin at once in several places. J. F. Meyer, of Roscoe, has received the contract for the one mile of grading and stone work in Coshocton.

Torbrook Coal & Railway Co.—The short line being built by this company in Annapolis County, Nova Scotia, from Wilmot Station, on the Windsor & Annapolis, will probably be completed in the latter part of September. The road is being built by the Windsor & Annapolis for the Londonderry Iron Co. to the Torbrook iron mines, about three miles from Wilmot, and extends south through South Farmington to the iron mines. The road has been graded with the exception of the last one-fourth of a mile. The track is now being laid, about 50 men being at work at present. F. A. Clark & Son, of Berwick, N. S., have just completed a Howe truss bridge over the Annapolis River with a span of 72 ft. The bridge will cost nearly $3,000. The line is very level, the heaviest grade being 15 ft. per mile and the heaviest fill 13 ft. The road is intended to be used in shipping iron from the mines to Londonderry for smelting.

Utah Central.—W. F. Tolley, who has the contract for the extension of the road from Park City to Moon's Mill, in Wasatch County, Utah, has taken a lien on the road. It is stated that this action is preliminary to resuming work on the extension, and that the rails will be immediately laid from Park City, Utah, to Moon's Mill, a distance of 30 miles.

Velasco Terminal.—The directors have concluded a contract for building and equipping this road with a Mr. Deyer, of Velasco, Tex. The first connection will be made with the International & Great Northern, at or near Chenango, at a point 35 miles south of Houston. The road will be pushed on to Arcola Junction at once and thence to other connections as practicable.

Western New York & Pennsylvania.—The formal opening of the branch from Nunda to Hornellsville, N. Y., will take place Aug. 27, when an excursion train will be run from Rochester to Hornellsville, through the Genesee Valley.

Wheeling & Lake Erie.—It is reported that a branch about eight miles long will be built from Rush Run, on the Ohio River, via Blue Run, to Southfield, near Steubenville, O., to reach coal mines in the vicinity. A survey is now being made.

Whitefield & Jefferson.—Brown & Ryan, of New York, who have the contract for the extension to Berlin Falls, 17 miles, have the grading in progress between Jefferson and Gorham, N. H., and the work between these points is making good progress. The road is being built by the Concord & Montreal, and it is proposed to complete it from Jefferson east to Gorham, where it crosses the Androscoggin River, this season. The route from Gorham is north about six miles to Berlin Falls parallel to the Grand Trunk. It is expected that the line will be opened for traffic next spring as far as Berlin Falls, the centre of a large lumber and paper-making industry. It is stated that the line will ultimately be extended northeast up the valley to Umbagog Lake, there to connect with the system of travel across the Rangeley Lakes and also opening up a large lumber business.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The statement of the earnings for July shows that on the lines east of the Ohio River, the earnings were $1,688,604, an increase of $65,664 as compared with the same month of last year. The operating expenses were $1,102,236; increase, $47,043; net increase, $18,621. On the lines west of the Ohio the earnings were $474,069; increase, $24,247; operating expenses, $391,566; decrease, $12,166; net increase, $36,413. The summary of the entire system east and west of the Ohio River shows the earnings to have been $2,162,673; increase, $89,911; operating expenses, $1,493,802; increase, $34,877; net increase, $55,034. The earnings and expenses for the ten months of the fiscal year 1890-91, compared with the same months of the fiscal year 1889-90, were as follows: Earnings were $19,778,882; decrease, $159,354; expenses, $14 041,257; decrease, $104,349; net increase, $55,005.

Boston & Albany.—The annual report for the year ending June 30, issued this week, gives the following result of operations:

	1890-91.	1889-90.	Inc. or dec.
Passenger earnings	$3,881,451	$3,768,867	I. $114,591
Freight earnings	4,373,988	4,446,585	D. 72.597
Miscellaneous earnings	958,782	935,623	I. 23,159
Total	$9,216,222	$9 151,068	I. $65,154
Operating expenses	6,807,750	6,276,778	I. 530,972
Net earnings	$2,408,471	$2,874,900	D. $465,619
Fixed charges	740,900	740,900	.....
Balance	$1,667,571	$2,133,390	D. $465,819
Dividend	1,600,000	1,600,000	.....
Surplus	$67,571	$533,390	D. $465,891
Passengers carried	11,688,069	11,295,637	I. 392,432
Passengers carried 1 mile	211,852,182	201,128,880	I. 10,723,302
Freight carried	3,913,873	3,883,115	I. 30,758
Freight carried 1 mile	401,099,271	402 241,138	D 1,141,867

The cost per passenger and per ton one mile was .825c. against .780c. in 1890 and .785c. in 1889. The operating expenses included the following expenditures: Maintenance of permanent way, $1,408,806; maintenance of engines, $426,745; maintenance of cars, $762,687; maintenance of buildings, docks, etc., $156,345; transportation expenses, $3,876,125; general expenses, $177,041; total, $6,807,751. The report says: "Considerable work has been done under the legislative act 'to promote the abolition of grade crossings,' and much more is projected. At a cost of $250,000, ten grade crossings have been separated during the year and 16 are in process of construction. Decrees to abolish six more have been rendered, the work on which will be commenced as soon as the contracts have been made. There remain between Boston and Springfield 45 level crossings to which the serious attention of the company is directed, as it is the desire of the directors that these should be eliminated as quickly as possible. The stockholders at the annual meeting Sept. 24, 1890, voted to authorize an issue of $5,000,000 of stock, under authority of an act of the legislature. The issue of stock is to be made on Jan. 5, 1892, and the shareholders, in anticipation of such issue, have paid into the treasury $527,320. There were purchased and built during the year 16 locomotives, 6 passenger cars, 10 baggage and combination cars, two dining cars, one postal car and the company's share (19 per cent.) of four buffet cars for the Boston & Chicago line. Nine hundred obsolete house cars have been changed into coal cars.

Canadian Pacific.—President Van Horne has just returned to Montreal from London, and, as usual, has baffled the interviewers in their hunt to find out what the visit was about. Mr. Van Horne says, however, that Quebec is now to be used by the Canadian Pacific as a port of shipment for Canadian grain to England, since the enormous increase in the wheat crop of the Canadian Northwest will much more than exhaust Montreal's terminal facilities. Elevators will be built at Quebec at once by A. J. Charlebois, of Ottawa.

Central Pacific.—The company reports net earnings for June of $736,005, an increase of $177,311 as compared with the same month last year. For the six months ending June 31 the net earnings were $3,433,735, an increase of $1,523,512 as compared with the corresponding period last year.

Chicago, Milwaukee & St. Paul.—The June report of operations of the road published this week show an increase in net earnings of $34,814 over 1890. From these the figures of operation for the fiscal year can be made up, showing a surplus of $699,168 above charges and dividends, decrease of $18,359. The figures follow:

	1891.	1890.	Inc. or dec.
Gross earnings	$2,147,614	$2,049,876	I. $97,738
Oper. expen. and taxes.	1,472,997	1,410.074	I. 62,924
Net earn	$674,617	$639,802	I. $34,814
Fiscal year to June 30.	1890-91.	1889-90.	
Gross earn	$27,504,224	$26,405,708	I. $1,098,516
Oper. expenses	18,366,500	17,173,098	I. 1,193,402
Net earn	$9,137,724	$9,232,610	D. $94,886
Other income	334,207	220,024	I. 144.183
Total	$9,471,931	$9,452,634	I. $19,297
Charges	7,237.251	7,214,154	I. 23,097
Balance	$2,234,680	$2,238,480	D. $3,800
Dividends	1,535,512	1,520,953	I. $14,559
Surplus	$699,168	$717,527	D. $18,359

The above surplus equals 1.51 per cent. on the common stock, against 1.86 per cent. for the previous year.

Chicago & Northwestern.—The annual report for the year ending May 31 has been issued. The following table gives a comparison of the operations of the company for the last three fiscal years:

	1889.	1890.	1891.
Miles operated	4,244	4,250	4,255
Gross earnings:			
From passengers	$6,261,277	$6,285,179	$6,700,351
From freight	18,193,646	19,654,213	19,829,341
From mail, express, etc.	1,237,336	1,225,445	1,263,982
Total	$25,692,259	$27,164,837	$27,793,674
Oper. expen. and taxes	16,027,287	17,405,105	18,291,006
Net earnings	$9,664,972	$9,759,732	$9,502,668
Deduct—			
Interest and rentals	$5,540,456	$5,486,197	$5,620,805
Sinking funds	58,000	202,570	201,301
Total	$5,598,456	$5,688,767	$5,822,106
Balance	$4,066,516	$4,070,965	$3,680,562
Dividends	3,444,504	3,444,979	3,445,804
Surplus	$622,012	$625,986	$234,758

In addition to the foregoing "balance," the profit from the operations of trans-Missouri lines was $51,951, against $112,456 in 1890, and $222,998 in 1889. The net receipts from land sales were $433,127, against $383,707 in 1890, and $394,168 in 1889. The net results to the company of the operations for the fiscal year ended May 31, 1891, were as follows:

Net traffic	$3,680,562
Net from trans-Missouri lines	51,951
Net from land sales	433,127
Total	$4,165,640

Equal to 6.53 per cent. on the total outstanding common and preferred stocks. The passengers carried in the last year numbered 13,184,829, an increase of 1,042,040, and the revenue was $6,700,351, an increase of $415,172. The freight tonnage moved was 13,616,872, an increase of 478,762 tons, and the number of tons carried one mile was 1,950,037,071, a decrease of 50,145,532 tons per mile. The average rate received per ton for each ton hauled was 1.46, against $1.50 in the previous year. The funded debt was increased by the issue of $2,720,000 four per cent. bonds for construction account of the trans-Missouri lines, the interest being chargeable against those companies, and paid in lieu of interest upon their own bonds, and for construction account of the Junction Railway. For equipment and improvements $5,000,000 20-year five per cent. debenture bonds were issued. The net increase in the funded debt was $7,585,000.

Chicago, Rock Island & Pacific.—The first through train of the road via the Union Pacific Bridge and Omaha, arrived in Denver, Col., Aug. 18.

Chicago & West Michigan.—The statement of earnings for the six months from Jan. 1 to June 30, is as follows:

	1891.	1890.	Inc. or Dec.
Gross earn	$797.448	$748,409	I. $49,039
Oper. expen	553,923	479 609	I. 74 314
Net earn	$243,525	$268,800	D. $25.275
Other income	5,990	2,340	I. 3,650
Total net	$249.515	$271,140	D. $21,625
Fixed charges	111,085	112,385	I. 31,700
Balance	$105,430	$158,755	D. $53,325

The dividends declared this year amount to 3½ per cent., the last being semi-annual. 1¾ per cent., payable Aug. 15.

The company earned 1.538 per cent. on 66,382 shares of capital stock. The proportion of operating expenses to gross earnings was 69.46 per cent., against 64.08 last year.

Cincinnati, Jackson & Mackinaw.—Receiver W. H. Brown has issued a circular concerning the proposed reorganization of the road, stating that the sale under the formal foreclosure of the mortgages against the road will occur about Oct. 6. Arrangements have been made to lease the line to the Cincinnati, Hamilton & Dayton.

Cleveland, Cincinnati, Chicago & St. Louis.—The gross earnings for the month of July were $1,162,217, an increase of $50,459.49 over last year. The increase is made chiefly in the freight earnings, the amount being $47,272.

Delaware, Lackawanna & Western.—The operations of the leased lines of the company for the quarter ending June 30 are reported as follows:

	1891.	1890.	Inc. or Dec.
Gross earn	$2,012 323	$2,106,243	D. $93,920
Oper. expen	1,078,544	1,103,229	D. 24,685
Net earn	$933.779	$1,008.014	D. $69,235
Fixed charges	581,249	570,082	I. 11,167
Surplus	$352,530	$4?2,932	D. $80,402

Des Moines Northern & Western.—This company has been recently formed in Iowa with a capital stock of $6,500,000 to consolidate the Des Moines & Northwestern and the Des Moines & Northern roads, which are at present operated under distinct organizations, although they are owned in the same interests and the directors of each road are practically the same. The Des Moines & Northwestern extends from Des Moines northwesterly to Cainsville, 111 miles, and is at present narrow gauge. It will probably be changed to standard gauge before October. It was operated between 1880 and 1887 by the Wabash system, but the line was surrendered in October of the last year. The Des Moines & Northern extends in a more northernly direction to Boone, Ia., a distance of 42 miles. It was formerly known as the St. Lois, Des Moines & Northern, but it was reorganized in November, 1889, under its present title and the gauge was changed from 3 ft. to standard. The first seven miles of road from Des Moines to Cline are at present operated jointly.

Iowa Central.—The annual report for the year ending June 30 gives the following result of the year's operations: Gross earnings $1,699,742, an increase, as compared with the previous year, of $110,779; operating expenses, $1,223,380, an increase of $63,183; net earnings, $476,361, an increase of $47,595. The total tonnage in the year was 1,131,229, against 1,042,195 tons for the previous year, and 886,688 for 1889. The strike of the coal miners in Iowa caused a decrease in tonnage in the months of May and June of about 60,000 tons.

Kansas City, Fort Scott & Memphis.—The following is a statement of the earnings for the fiscal year to June 30:

	1890-91.	1889-90.	Inc. or Dec.
Gross earn	$4,703,142	$4,937,431	D. $234,289
Oper. expen	3,389,218	3,386,645	I. 2,573
Net	$1,313,924	$1,550,786	D. $236,862
Other income	11,803	60,921	D. 49,118
Total net	$1,325,727	$1,611,707	D. $285,980
Fixed charges	1,068,846	1,042,550	I. 26,296
Surplus	$256,881	$569,157	D. $312.275
Dividends	208,972	.....	.....
Surplus	$47,909	.....	.....

Out of the balance of $256,881 was paid $109,992, the four per cent. on the preferred stock and $98,980, the one per cent. on the common, leaving a surplus of $47,909. The Current River road failed to earn charges by $26,948 for the year, and the Kansas City, Clinton & Springfield failed to earn them by $37,297, a total of $64,245. The semi-annual dividends on the common stock has been passed, and consideration of that on the preferred stock deferred.

Kansas City, Memphis & Birmingham.—The following table gives the earnings for the fiscal year to June 30:

	1891.	1890.	Inc. or dec.
Gross earn	$1,192,165	$1,207,733	D. $15,568
Oper. expen	961,248	784.767	I. 176,431
Net earn	$230,917	$423,966	D. $193,049
Total income	$251,039	$450,104	D. $199,065
Fixed charges	427,105	400,342	I 26.763
Deficit	$176,065	Surp. $49,761	D. $225,826

The operating expenses were 80.6 per cent. of gross earnings, against 64.8 per cent. the year before. The decrease in net earnings is mainly due to exceptional causes, such as short crops west of the Mississippi River, the coal miners' strike from Dec. 2 to Jan. 13; rain, almost incessant during the winter months, seriously affecting business, as well as adding largely to the cost of operating, in repairs of road-bed, track, etc.

Manhattan (Elevated).—The following is the statement of the company for the quarter ended June 30:

	1891.	1890.	Inc. or Dec.
Gross earn	$2,545,263	$2,457,213	I. $88,050
Oper. expen	1,287,668	1,201,926	I. 85,742
Net earn	$1,257,595	$1,255,287	I. $2,308
Other income	35,000	21,500	I. 13,500
Fixed charges	600,547	566,588	I. 33.959
Net income	692.048	71 ,199	D. 18,151
Cash on hand	115,726	866.032	D. 750,306
Profit and loss sur	2,675 845	1,983,312	I. 692.533
Inter. on funded debt.	477,157	433,465	I. 43,692

New York, Ontario & Western.—The company reports net earnings for June of $82,676, an increase of $32,774 as compared with the same month last year. For the year ending June 30 the net earnings were $654,330, an increase of $221,926 as compared with the corresponding period last year.

New York & New England.—The following is the comparative statement to the Massachusetts Railroad Commission of the earnings for the quarter ending June 30 and the year to the same date:

Three months to June 30.	1891.	1890.	Inc. or Dec.
Gross earn	$1,572,616	$1,512,717	I. $59,929
Oper. expen	1,071,035	1,035,932	I. 35,103
Net earn	$501,611	$476,785	I. $24,826
Other income	2,022	864	I. 1,158
Total net	$503,633	$477,549	I. $26,084
Fixed charges	465,824	429,204	I. 36,620
Balance	$37,809	$48,345	D. $10,835
Year to June 30			
Gross earn	$6,149,245	$5,849,691	I. $299,554
Oper. expen	4,133,505	3,782,153	I. 351,349
Net earn	$2,015,740	$2,067,535	D. $51,795
Other income	6,386	3,750	I. 2,636
Total net	$2,022,126	$2,071,285	D. $49,159
Fixed charges	1,799,573	1 690,967	I. 108,606
Balance	$222,553	$380,318	D. $157,765

Northern Pacific.—The gross earnings of the company for July, 1891, on 5,202 miles of road were $2,392,031, as compared with the gross earnings of $2,490,046 in the same month of last year, a decrease of $107,015. The mileage has increased 216 miles, being 4,986 miles in July, 1890.

Old Colony.—The following statement is the quarterly report of the earnings of the road. The figures are for the three months to June 30:

	1891.	1890.	Inc. or Dec.
Gross earn	$2.088,810	$2,000,351	I. $38,459
Oper. expen	1,577,340	1,685,179	D. 107,839
Net	$161,470	$315.172	I. $146,298
Other income	340.174	254,906	I. 85,268
Total net	$801,644	$570,078	I. $231,566
Fixed charges	433,769	419,194	I. 14,575
Balance	$367,875	$150,884	I. $216,991

The "other income" includes premium on stock sold in 1891, $123,625 and $145,737 in 1890.

Richmond & Danville.—The following is the statement of the earnings for July:

	1891.	1890.	Inc. or dec.
Gross earnings	$1,106.726	$993,419	I. $113,306
Operating expenses	762,672	709.681	I. 52 996
Net earnings	$344,047	$283,737	I. $60,310

Of this increase the Richmond & Danville proper gross increase is $37,979; net increase, $20,421. Virginia Midland gross increase is $17,819; net increase, $13,046.

San Antonio & Aransas Pass.—At the instance of the reorganization committee, the New York holders of first mortgage bonds amounting to $15,000,000 filed at San Antonio, Tex., Aug. 14 a petition for a foreclosure of the road.

Southern Pacific.—The gross earnings of the Pacific system for June were $3,119,354, and for both Atlantic and Pacific system $4,051,980, an increase of $154,488 over the same month in 1890. For the same month the operating expenses of the Pacific system were $1,741,257, and for both systems $2,493,704, a decrease of $52,328. During the six months the Pacific system earned $16,677,635, and both systems $22,611,531, an increase of $1,010,689. The operating expenses of the Pacific system were $10,204,448, and $14,856,676 for both systems, an increase of $649,577. The net earnings of the Pacific system were thus $6,473,187, and for both systems $7,754,855, an increase of $1,460,266. The earnings of the Atlantic system were given last week. As to other charges there were $6,273,875 in the Pacific system and $1,299,605 in the Atlantic, making a total of $7,569,560, against last year's total of $7,453,768, an increase of $115,792. These charges include the payment of the interest on the bonds of the road, which, of course, consumes most of the amount. There was a surplus this year in the first six months of $185,295, against a deficit last year in the same time of $1,359,359.

Union Pacific.—The directors have approved the preliminary plan for the relief of the company from its more pressing unfunded obligations. The holders of about half of the floating debt have pledged themselves to acceptance. The combany offers its creditors three-year notes, bearing six per cent. interest, at 92½, the notes being secured by all the treasury securities, which are placed in trust with Drexel, Morgan & Co. The securities are estimated at current market values at about $37,000,000. The floating obligations are calculated at from $19,000,000 to $20,000,000. A committee of five to represent both the railroad company and the creditors was appointed as follows: J. Pierpont Morgan, Edward King, President of the Union Trust Co.; John A. Stewart, President of the United States Trust Co.; Alexander E. Orr, and Frederick L. Ames, of Boston. It is understood that the syndicate will issue $24,000,000 worth of bonds bearing six per cent. A portion of this issue only will be used to take up the floating debt, estimated at $19,000,000. A balance will probably be retained to be used to provide necessary funds in case any contingency should arise. The bonds will be issued to the syndicate of guarantors at 92½ per cent. J. Pierpont Morgan is to become the custodian of the securities. By this plan the floating debt is not extended and retired. The directors merely approve a plan whereby they hope to extend and retire the debt. They entertain no doubt that this plan will be carried out with entire success, but there is strong opposition from some of the minority creditors. The former plan to have the bonds underwritten has been abandoned.

The preliminary statement for June published last week showed on 7,668 miles a gross decrease of $346,076 and a net decrease of $389,239. The whole system for June shows:

	1891.	1890.	Inc. or dec.
Mileage	8,143	8,028	I. 115
Gross earn	$3,524,741	$3.910,077	D. $385,336
Oper. expen	2,396,419	2,377,974	I. 18,445
Net earn	$1,128,322	$1,532,103	D. $403,781
For six months:			
Gross earn	$19,437,363	$20,715,935	D. $1,278.571
Oper. expen	13,653,943	14,664,500	D. 1,010,557
Net earn	$5,783,420	$6 051,434	D. $268,014

Wabash Railroad.—The net earnings for June were $250,027, an increase of $74,974 as compared with the same month last year. For the six months ending June 30 the net earnings were $1,488,200, an increase of $57,064 as compared with the corresponding period last year.

A mortgage in favorof the Ha skell & Barker Car Co., of Michigan City, Ind., was filed for record last week by this company for $83,338, being two-thirds of the contract price for 250 box cars to be delivered in August.

Wagner Palace Car Co.—The annual report of the company for the year ending June 30, 1891, including the business of the company in 16 states and the Dominion of Canada, shows: Gross earnings of $3,297,731; operating expenses, $2,669,617; net earnings for the year, $628,-113. The operating cost for the year, exclusive of the depreciation in the value of rolling stock and equipment, was 80.7 per cent.

Wisconson Central Co.—The company has renewed its lease of the Chicago, Milwaukee & St. Paul tracks from Rugby Junction into Milwaukee. The present lease was for a period of five years, and it expires this month.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Aug. 19, 1891.

The Central Traffic Association lines have found themselves compelled to join in the harvest excursions, although they, like the Western lines, were not at first favorably disposed to do so. They will be obliged to accept the $10 rate from Chicago to Kansas City, forced by the Alton, but will join the Western lines in making a rate of 1 1-3 fare to Chicago and same from Kansas City west, using the $10 rate only between Chicago and Kansas City.

The Chicago, St. Paul & Kansas City has appealed from the decision of Chairman Finley in denying their application to be allowed to transfer passengers and baggage free from their depot to the union depot at Kansas City.

After failure to get the Southern lines to restore their rates on mineral paint (ground iron ore), from Birmingham and Chattanooga, Chairman Midgley has authorized the Western Freight Association lines to use the rates so made to the Missouri River, which are the rates on pig iron in car loads, viz., to Kansas City, Atchison, Leavenworth and St. Joseph, $5 per ton of 2,240 lbs.; to Council Bluffs and Omaha, $5.84 per ton of 2,240 lbs.

The Chicago-St. Paul lines have agreed to advance the lake and rail rates on flour and mill stuffs from Minneapolis to Boston to 35 cents per 100 lbs., New York 30 cents per 100 lbs., effective Aug. 25, with the usual differentials. Differences are to be submitted to W. H. Truesdale, receiver of the Minneapolis & St. Louis, for arbitration.

The Rock Island opened its Denver line via Omaha and Lincoln, over the Omaha bridge, Sunday, August 15.

The Chairman of the Western Freight Association has decided that the practice of billing melons in bulk L. C. L., and also C. L., with the privilege of stopping to unload a part of the lot, is contrary to the classification and rules and must be discontinued.

Chairman Finley has been investigating a complaint that the Chicago and Northwestern violated the agreement of the Western Passenger Association by carrying passengers on special trains from Chicago to Milwaukee and Milwaukee to St. Paul on June 19, the occasion being an excursion of Turners. The respondent set up in defense that the trains in question were rendered necessary by reason of the large number of passengers to be transported on that day, and were sections of regular trains; that the transporting of passengers in Wagner cars was a measure of economy, as the cars were going to Milwaukee "light" for use there, and the passengers did not know that they were to occupy these cars until they arrived at the station. Chairman Finley is satisfied that the statements of the Northwestern are supported by the facts, and has ruled that the complaint is not sustained.

There is a prospective war in passenger rates from Chicago to Niagara Falls, occasioned by the running of some cheap excursions by the lines from outside points. It was intended to restrict the excursions to points 40 miles from Chicago, but a smart newspaper man in this city discovered that by using a local round trip rate to Crown Point, Ind., on the Erie, and adding the excursion rate from there, he could cut the regular round trip rate to Niagara Falls from $23.65 to $8.40. The competitors of the Erie at once charged collusion, but this the officials of the Erie strenuously deny, but say they are powerless to prevent a passenger buying a regular round trip ticket to Crown Point and the excursion ticket from there, if he so elects.

The Joint Committee of the Trunk Lines and Central Traffic Associations has decided that the differential on tabacco to Eastern cities by rail and sea via Newport News and Norfolk shall be two cents per 100 lbs. on insured bills of lading less than the all-rail rates thereto based on the rates to New York. Twenty per cent. off the gross weight of dressed poultry in packages packed in ice is also authorized during the months of March, April, May, October and November, and for June, July, August and September 33⅓ per cent.

The Northern Pacific and Great Northern have requested the Western Passenger Association to make the same basing rates to St. Paul on harvest excursions as are made via Kansas City as forced by the Alton.

It is now reported, but only partially confirmed, that the small packers have purchased 1,000 acres of the Stickney tract and will remove to that location. The principal firms said to be concerned in the movement are: The Allerton Packing Co., the Chicago Packing and Provision Co., the Anglo-American Packing Co., the International Packing Co., the Cudaky Brothers, Lipton & Co., Underwood & Co., Jones & Stiles, Moran & Healy, the T. J. Wells Co., the Calumet Canning Co., John C. Hateley, L. B. Dowd & Co. and Silberhorn & Co. There is a strong suspicion, however, that the reported purchase is merely a bluff to force the Stock Yards Co to grant them concessions which the "Big Three"—Armour, Swift and Morris—have obtained and which the small packers have heretofore asked in vain. Their removal would mean the loss to the Stock Yards Co. of a large portion of their business, and it is surmised this is the club which it is proposed to hold over the Stock Yards Co.

While proposed advances in lake and rail rates eastbound are contemplated, westbound rates are being reduced by all lines. Lake rates are firm at 2½ to 2¾ cents on grain. Lake and rail rates, Boston to St. Paul, are now quoted as follows by New England roads and Northern Steamship Co.:

1st	2d	3d	4th	5th	6th
86	71	59	41	33	33

It is said that the Boston & Albany will meet this at once.

The Burlington has notified the Board of Rulings that they will resume paying ticket commission to ticket agents of the Chicago & Grand Trunk, Detroit, Lansing & Northern and Chicago & West Michigan, these roads not having carried out the provisions of the agreement not to ticket over the Alton or accept Alton tickets.

Traffic Notes.

The Texas Central and the Santa Fe have got up a little passenger rate war of their own

The summer tourist business is reported unusually light in Colorado. This is attributed to general hard times.

It is reported that the Rock Island will build an independent branch, giving it direct entrance to the World's Fair grounds.

The crop of wheat and oats in Texas is being moved to market rapidly, and the railroads are crowded going to New Orleans, Memphis and the seaboard.

The International Association of Ticket Agents meet at Minneapolis, Sept. 7, and, after transacting their business, propose visiting Yellowstone Park.

About Sept. 1 a train of 25 cars loaded with pickles will leave Pittsburgh for the West. The freight on this shipment will probably average $125 a car, or over $3,100 in all. In consequence the shipment is being eagerly watched by agents of Western lines.

The Southwestern Steamship and Railway Association has made a rate of 60 cents per 100 lbs. on packing-house products from St. Louis to Houston and Galveston, and 33 cents per 100 lbs. from New Orleans to the same points. The rate on molasses (carloads) from St. Louis and Kansas City to the above points is to be advanced Sept. 1 from 45 to 48 cents per 100 lbs.

General Passenger Agent Eustis, of the C. B. & Q., has advised Mr. Donald, of the Central Traffic Association, that the Burlington will be obliged to pay passenger commissions to the Detroit, Lansing & Northern, the Chicago & West Michigan and the Chicago & Grand Trunk. He asserts that these roads have been ticketing passengers without reserve over the Alton. It is feared that similar action will be taken by other Western roads. The Canadian Pacific will not cease paying commissions so long as the Northern Pacific maintains its contract with a certain emigration agency.

Dakota Elevators.

There is every prospect of war between the elevator companies and the North Dakota Railway Commission. Unless a way of settling the difficulty is found, the indications are that the largest yield of grain in the history of the state will be harvested without a public warehouse open to receive it. The elevator companies will decline to do business under the operation of the public warehouse law, and will attempt to operate as private elevators. The Railroad Commissioners claim that they cannot buy, store and ship wheat as private elevators, and say that they will close the first open elevator by injunction.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines last week amounted to 45,856 tons, against 47,675 tons during the preceding week, a decrease of 1,819 tons, and against 56,438 for the corresponding week of 1890 a decrease of 10,582 tons. The lake lines carried 121,200 tons, against 114,212 tons during the preceding week, an increase of 6,988 tons. The Chicago & Erie carried 6,786 tons more than any other line and the Lake Shore & Michigan Southern carried 6,417 tons.

Cotton Bills of Lading.

A circular letter has been sent by New York bankers to the bankers and shippers of all the Southern cities, calling attention to the form of bills of lading adopted by the Cotton Conference at Liverpool, and urging its indorsement. The new form is known as the "1891 Cotton Conference form," and its principal feature is the "responsibility clause," which is as follows:

"It is mutually agreed that in the absence of fraud, clerical or obvious error, this Bill of Lading signed by the Master shall be conclusive evidence against the shipowner that the above-mentioned number of bales have been received, but this Bill of Lading shall not be signed except for cargo already on board, or actually delivered into the steamer's custody alongside on the quay in single compressed bales, within reach of her tackle."